MOTOR AGE

Vol. XXXII
No. 6

CHICAGO, AUGUST 9, 1917

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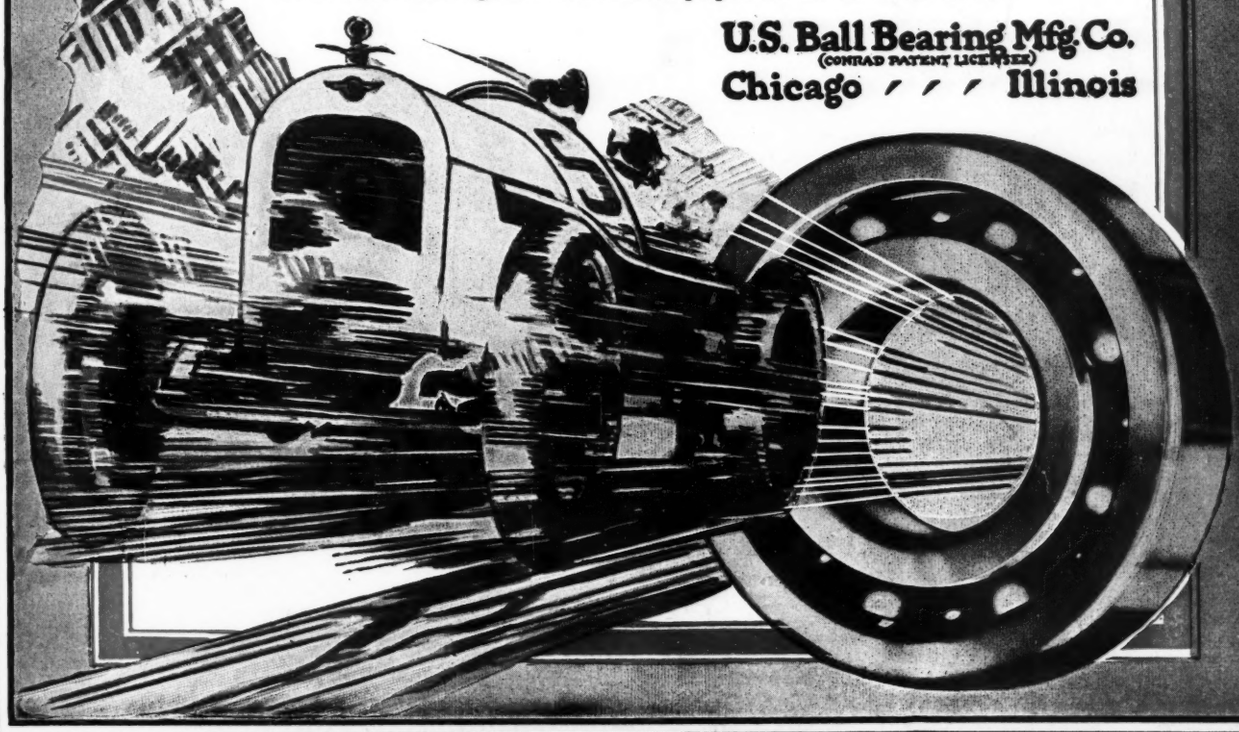

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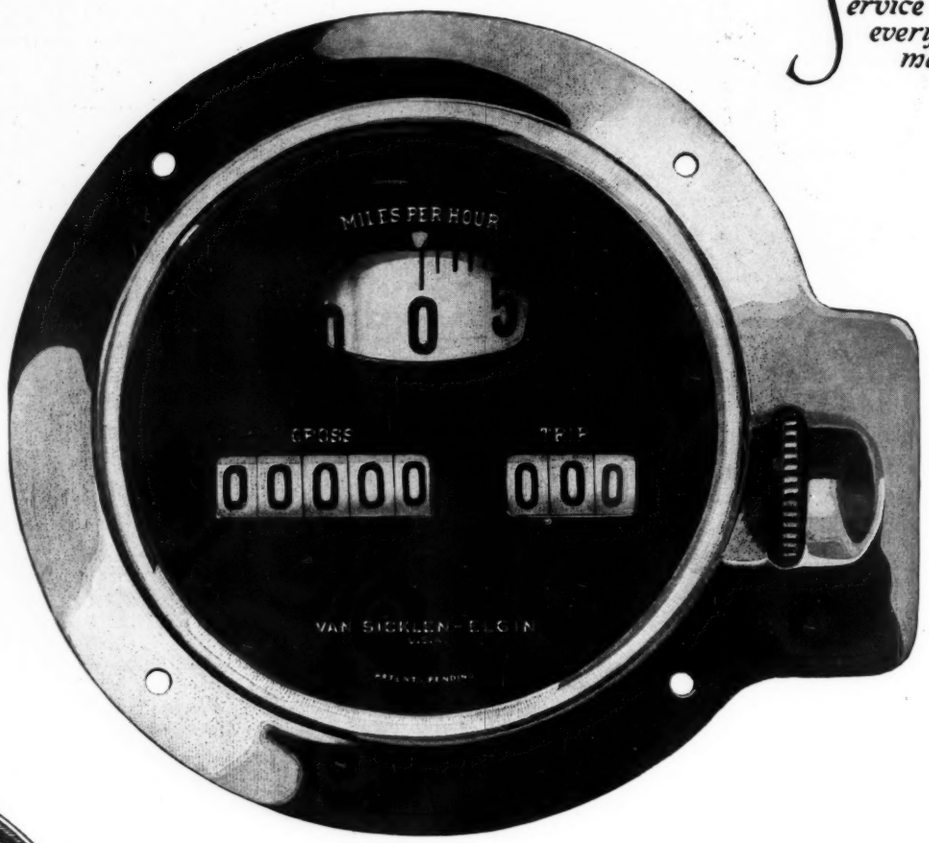

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NEXT WEEK

Little of that before the nation just now is of more moment than the tractor. It figures both in its relation to the food supply and its role in the world war. See MOTOR AGE next week for full particulars of the national tractor demonstrations which are being held at Fremont, Neb., this week.

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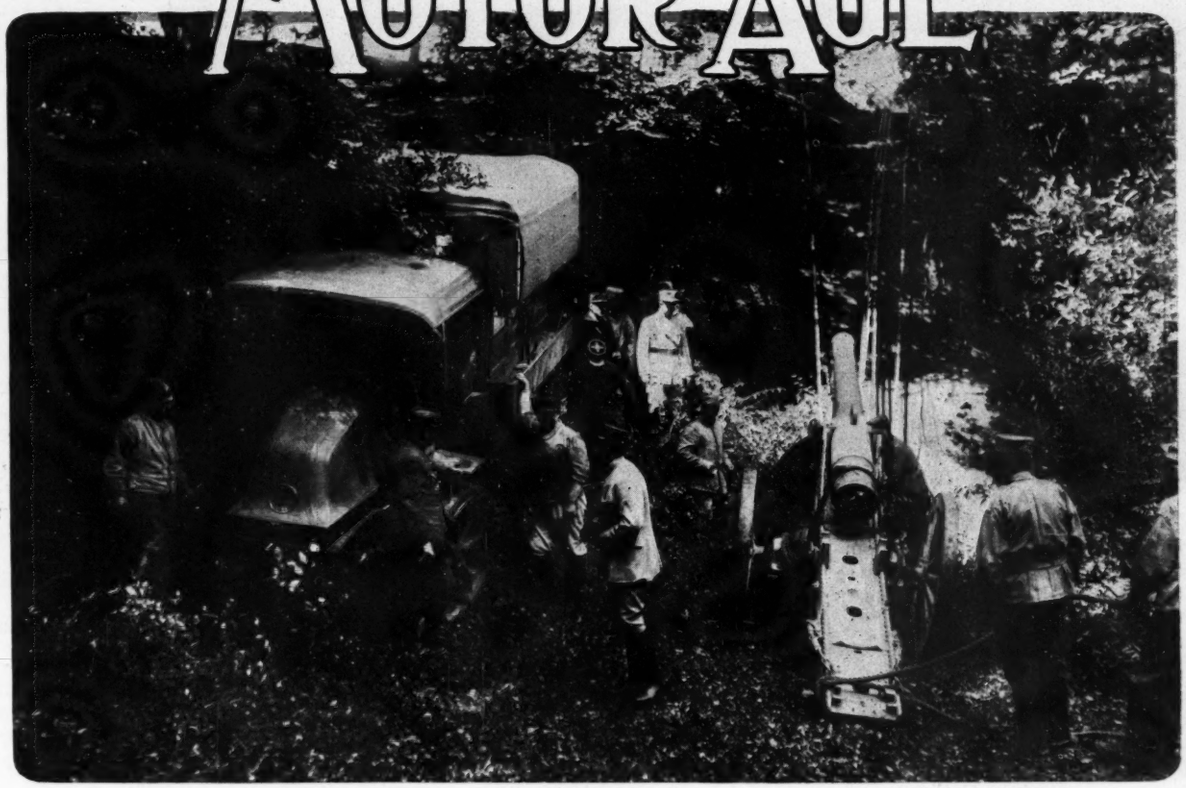


Convoys of 3½-tonners fed the guns. The guns worked all day with varying degrees of intensity, hardly slackening when night came

Motors in the Italian Offensive

By W. F. Bradley

MOTOR AGE'S *special correspondent with the armies in Europe*

FOR weeks we had speculated on the date of the great offensive. Time after time the place, day, and hour had been fixed by various persons, from the assistant cook to the major in charge of the divisional medical service. As a general rule, the lower the rank, the more detailed the forecast. Occasionally artillery liveliness happened to coincide with the day selected by the drug store orderly or the canteen attendant, and for a few hours those individuals acquired fame as men who had some mysterious connection with Cadorna's staff.

The most sensible prediction was that of the chief mechanic, who swore that the Austrians would "get hell" within a fortnight. As proof he pointed to the endless procession of men, guns, ammunition and material going up the hills toward the front and contended that it was impossible to maintain such numbers of men in these hill trenches for more than fourteen days. We were about twelve miles to the rear of the Italian lines and due west of the city of Gorizia, which, it was understood, Cadorna was going to wrest from the Austrian grasp. Lying in the hot, whitewashed, rat-infested attics turned over to the ambulance drivers, the most persistent note throughout the night was not the boom of the guns but the steady rumble of motor trucks going to or returning from the front.

Irritated by the roughness of the army blankets, or haunted by the fear that the coarse straw mattress might harbor fleas, some restless newcomer would spend an hour at the open window looking down on the main road 20 yd. in front of this one-time Austrian-owned chateau. On those bright summer nights, or in the gray of the early morning, he would observe a line of traffic which varied but never ended. Imposing Fiat tractors or sturdy little Aratrice machines went by at 4 m.p.h, hauling the lumbering heavy artillery, caissons, platforms and other material, the existence of which never had been suspected and the use of which was unknown to the non-technical mind. Fast pneumatic-tired trucks went past at 20 m.p.h. with the roar from the cut-out so dear to the Italian driver. Convoys of twenty 3½-tonners loaded with shells, timber, girders, cement, pontoon bridge material, food or water rolled past with more or less noise, according to the nature of their load.

Editor's Note—MOTOR AGE *takes special interest in commending to readers this article on Motors in the Italian Offensive. Just as motors saved Verdun so did motors make possible the capture by the Italians of the city of Gorizia. Added to this is the interest in that the author was an eyewitness of the conditions he describes, with an ambulance in that steady stream across the captured bridge over the Isonzo river.*

Although motor traffic predominated, it did not have a monopoly of the highway. Being one of the main roads from the Italian bases to the most critical portion of the front, it had to be shared by mechanical and animal traction alike, together with bodies of infantry and, very occasionally, groups of cavalry. The volume of sound rose and fell, but it never ended, for the procession never ceased. In all cities traffic slackens or ceases altogether during the night or the early morning hours, but on that road to the Italian front silence never reigned and there was never an interval in the procession of more than 3 min. duration.

Orders were given for me to accompany the driver of Buick ambulance No. 26 to the advanced dressing station at Mossa, on the main road to Gorizia. Thus I was one of that procession of motor cars bound for the front. Although the road had been widened at numerous places and although there were one-way loops through several of the villages, traffic conditions for the first 6 miles were too intense to allow of anything but a steady jog. The morning

Sometimes the soldiers had to step in and pull the gun a short distance on a mountain road, around a sharp curve, for instance

was hot, but there had been a heavy rainstorm during the night, and the road surface was still sufficiently greasy to cause rubber-tired trucks to skid dangerously and perform the crab walk when they pulled out in an endeavor to get ahead of slower traffic.

It was not a road which ever had been designed for a great volume of traffic, and somehow or other it seemed strange that everybody should want to use that particular piece of road. Although the thought never found expression, there was consciousness of the feeling that it was unreasonable for everybody to want to go to the same place at the same time. The war was of minor importance; the one dominating feature was traffic and traffic conditions.

Gradually, almost imperceptibly, the number of vehicles diminished. Regiments on the march turned off to left or right, down lanes or over fields; the convoys disappeared, the country swallowing them up, as it were. The driver of the ambulance stated that the road was frequently under fire. Evidently it had been, for crowded, intact villages had given way to wrecked hamlets. The nature of the road showed that shell holes had been filled up with any kind of material available, and on each side of the highway were screens of dried rushes, about 12 ft. in height, erected to hide us from enemy view.

But there were no more direct signs of war. Mossa proved to be a very much damaged village, with military traffic police at every corner, but with very little traffic. This was the front, or at any rate as near the front as any motor car could go. Just exactly where the front line trenches were situated and how far the enemy was away, nobody seemed to know. The priest gave the distance as 500 yd.; the doctor, questioned separately, stated 1500.

The front, as I learned afterward, has no clear geographical position. Men with entirely different destinations constantly were being encountered on their way to the front; but when finally you did find yourself in a trench out of which you could not climb without coming into view of the enemy, you found it was no longer referred to as the "front" but as "the zone of operations."

That dressing station at Mossa was an Austrian farmstead which had been cleaned up according to military rule. This consisted in packing all the furniture tightly into a little outhouse and spraying the walls of every room with limewash delivered under pressure from a tank on a soldier's back. Thus the operating room contained two tables, a few empty stretchers and some surgical instruments. The adjoining room, used as a dining hall by the staff, contained a table and half a dozen chairs—nothing else. This method of enforcing cleanliness is radical.

This photograph was taken during the battle of Gorizia. Soldiers played cards on the stone wall, dodging when a shell whistled. This house could not dodge

Could Enter Two Trenches

The yard which we shared as a garage with an Italian horse ambulance had in it two entrances to trenches. Going down a long flight of steps, we could pass under the road and reach the front line trenches in the fields beyond; while another hole in the ground, appearing at first sight like the entrance to a hen coop, would enable us to pass under a low hill and reach another portion of the front, so we were told.

There were neither sick nor wounded. An Austrian airplane appeared in the clear blue sky and was fired at by the Italian guns, which did nothing more than form little white puffs around it, without interfering with its work in any way. In the street, under the lee of a stout stone wall, half a dozen Italian soldiers played cards. The whistle of a shell caused them to fall in all manner of ridiculous positions and scurry for a hole in the ground like so many frightened rabbits. The shell burst somewhere in the neighborhood, but in less than 5 min. the men were on the bench again, manipulating their cards. It was impossible to wander about, for the traffic police objected; besides there is a certain vagueness about the position of the enemy at these forward stations.

Dinner was served in that army whitewashed room, and when the meal had been disposed of we were informed that it was the correct thing at the front to sleep for an hour, some camp beds being provided for that purpose in one of the upper rooms —whitewashed, like the others. The after-

Shells at no time stopped the motor traffic altogether. The road along which this Fiat ambulance is running often suffered from the enemy's shells

noon brought the report of a few wounded, but it was not until 2 hr. later that the promise materialized in the shape of a soldier carried in by hand on a stretcher. He had been hit on the head by shrapnel and had lost one eye. The surgeon decided that with his appliances he could do nothing and turned the wounded man over to the priest, who placed his chair alongside the stretcher and, while reading his newspaper, mechanically bent down and replaced the blanket as often as the semiconscious and restless wounded man shook it off.

Wounded Wait

As other wounded were reported, the surgeon decided that it was not necessary to make a special trip with the one stretcher case. We waited an hour, 2 hr., while the wounded man moaned and the priest interrupted his reading or his comments on the day's war bulletin to replace the blanket which the wounded man would shake off. When the horse ambulance pulled up in the yard there descended from it a scared looking youth with his hand in his breast and a tag tied to his tunic indicating that he was sick.

We set off with the two, driving slowly and avoiding the shell holes, for the man on the stretcher was moaning and visibly suffering. He quieted during the run and when, half an hour later, we ran into the yard of the big advanced surgical hospital he had ceased to move. A red-faced bantam-type Italian officer bent over the stretcher case and turned towards us fiercely with the word "morte." The driver protested that he had come as carefully as possible, and after a superior officer had examined the case it was explained that the papers stipulated we were to deliver a live man and they could not accept a dead one.

So we returned to the front, with the scared youth looking more scared than ever, sitting inside with the corpse but keeping as near to the door as possible. They relieved us of our gruesome burden at the forward dressing station and ordered us to take the sick soldier to another hospital at the rear. On the way there we were hailed from a field hospital and filled up with ten sick. When we got rid of them, the long summer day had come to a close; the roads were still crowded, but the great offensive had not begun.

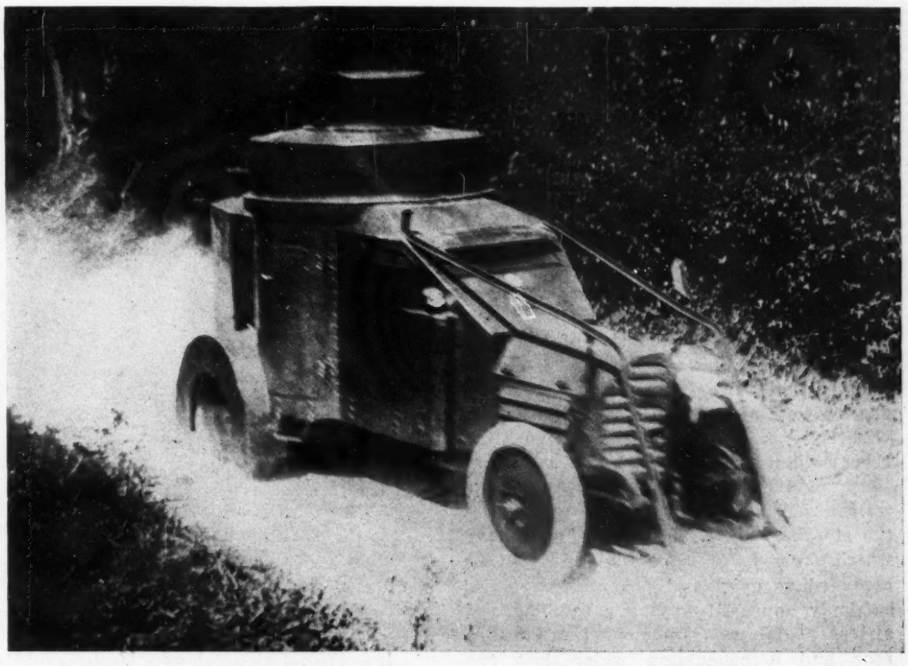
Dusk was falling as we left that mountain village for a position at the rear. For 10 miles that road wriggles along the mountain side, occasionally rising but generally falling, at no place wide enough for three vehicles abreast and not infrequently presenting a sheer drop on one side and a vertical wall on the other. Taking advantage of the dim light, masses of troops were being brought up. They climbed laboriously, under full equipment, and when the order was given to fall out they dropped where they stood, in the middle of the road or on the banks, it mattered little. From time to time a big black staff was observed carried by a couple of men. These were the regimental colors, rolled and carefully protected by a waterproof housing, for the troops were going into action.

Infantry alone did not occupy the road. There were mule columns, long processions of motor trucks loaded with building material and ammunition, an occasional staff car. Before attempting to get round any bend it was necessary to run ahead and ascertain that the road was clear; at frequent intervals we passed other motors with margins of a fraction of an inch; and when darkness settled fully, the best way to proceed was with one man seated on the front fender and another at the steering wheel. Farther in the rear the infantry gave way to artillery, column upon column, lumbering along at 4 to 5 m.p.h., with no other light than the glow from the reddened exhaust pipe of the gasoline tractors. We averaged not more than 7 m.p.h under such mountain traffic conditions. Fifteen miles from Quisca the procession was still rolling up toward the front. "The offensive is coming soon," we declared.

How Activities Started

Regarded from our own localized standpoint, the Austrians and not the Italians started the offensive. The enemy had caught sight of and taken objection to some of the activities on our side and put in a curtain fire of double effect shells—shrapnel and high explosive combined—just between our quarters and the dressing station to which we were attached. Two batteries of 75s, not far in the rear, accepted the challenge in such vigorous fashion that every man stopped work, his whole attention riveted by this personal fight which really appealed to one sense only, that of hearing.

The gunners fired at regular intervals of



Aircraft are not alone when it comes to reconnaisance. This Lancia armored car was in Austrian territory when photographed

The Red Cross repair gang at work. The ambulance has broken down and the truck is trying to tow it away

a few seconds, so that each crack and the whistle of each shell could be distinguished; then they speeded up just as one might accelerate an open-exhaust racing motor, and instead of individual whistles overhead there was a noise like escaping steam; then half the battery fired simultaneously, or at such brief intervals that it was impossible to distinguish the individual crackles. Two drivers who had just come in through the barrage fire jumped off their car and, old-stagers though they were, danced about the yard excitedly, shouting, in a voice which was a mere whisper in that turmoil, "Give 'em hell, give 'em hell."

Continuous Artillery Battle

Unlike other periods, the artillery activity did not die down at the end of 10 min., 15 min., half an hour or an hour, but continued all day, with varying degrees of intensity, and hardly slackened when night fell. Every kind of gun joined in the concert, and they made their presence felt from all kinds of unexpected quarters. Although living among the artillery, it is impossible for any ordinary soldier to have more than a fragmentary acquaintance with the movements of the artillery or to be able to locate the positions of more than a fraction of the guns.

We knew, for instance, that a battery of 75s was located on a certain knoll and that as we passed by the muzzles of the guns were only 15 ft. or so above our heads. At another point two 102-mm. guns on motor chassis were secreted in a roadside garden with only a high stone wall separating them from us. Thus a flash and a bang at these points did not cause more than a momentary start and a quickening grasp of the steering wheel. But when, on a road which from long usage had come to be regarded as quiet and peaceful, a soldier suddenly appeared waving a red flag and almost at the same moment there was a roar and a concussion which left one stunned for a few seconds, the driver could be forgiven for cursing the system of placing 305-mm. guns in close proximity to the roadway.

Although the bombardment began in the morning, it was not until the middle of the afternoon that the ambulances began to get busy. Men came to the dressing station afoot, carried on stretchers, brought by horse ambulances, and in a few cases in motor cars which had gone ahead of the most forward medical quarters. The work became mechanical: as soon as the ambulance entered the dressing station yard, four stretcher cases were put aboard and, without a word the driver moved off, deposited his load at a hospital in the town of Carmons, returned as fast as traffic conditions would allow, was again loaded up, and went out once more.

There was no break, and although there was plenty of variety after a time it failed to interest and even the excitement ceased to excite. Meals were forgotten; the calendar ceased to exist, and, after the first few trips, the groans and shrieks of the wounded could be listened to with a calmness which in ordinary times would have appeared like brutality. After 24 hr. uninterrupted evacuation the first permanent hospitals were filled and all the overworked staffs were convinced that they alone were receiving wounded from the front. Thus, instead of the attendants rushing out with alacrity, unloading immediately and asking questions of the operations at the front, the driver found staffs too busy to even note that ambulances had pulled into the yard, or perhaps he was told plainly that he must take his wounded somewhere else.

One of the main hospitals was a big public school with its main hall used as a reception room, into which the drivers dumped their burdens and hurried away, for despite open doors and windows the air was neuseating with the odor of death. Like the others, it was full, so full that the doctors had difficulty in moving about among the stretchers we laid on the floor, and only the most urgent cases could receive attention.

Identifying the Wounded

The first indication that all was going well was the presence of Austrians among the wounded. The system of registering and supplying each ambulance driver with a duplicate list of the wounded he had to carry had broken down under the stress of the battle, the only means of identifying men who could not speak being by the small locket with an official paper inside carried by every Italian soldier.

Thus, there was no difference in the manner of treating an enemy and a friend. During the height of the battle, four ambulances went into a forward surgical

It is almost as much of a traffic problem for the artillery and supply columns to pass through the narrow streets of a mountain village on the Italian front as to pass along a mountain trail

motor hospital, and of the twelve men carried, four proved to be Austrians. As they were being unloaded a staff car drew up, stopped an instant while the occupants looked at the scene, then quickly and silently disappeared. "That was the king of Italy," remarked one of the hospital staff.

After 26 hrs.' constant driving, 3 hr. sound sleep, notwithstanding the roar of the artillery and another period of 10 hr. driving, instructions were given to proceed to the station at Quisca. Although less than 1000 ft. above sea level, Quisca can be reached only by a single road blasted ledge-like out of the solid rock. Three miles before the village was reached this road carried one solid mass of motor and mule traffic which moved along like a sluggish stream, for the village with its narrow streets restricted the flow of current, and a short distance beyond the village, the enemy position dammed the stream entirely. To take to the fields was impossible, for the road itself was the only level portion of country. Below a clear drop to ledged vineyards with trenches running through them; above, a vertical wall.

After standing an hour on the road, unable to move an inch, the car was abandoned and we walked ahead to Quisca. The church and the 20 or 30 sq. yd. of space in front of it were packed tight with Austrian prisoners. The pack was so great that only with the greatest difficulty could a passage be forced through them. They were not guarded and needed no watching, for they could neither climb up the mountain nor drop down the cliff, and the solid mass of traffic prevented them using the road. They appeared to have no desire to run away but clamored for water, which could be obtained only from the houses. Around one of the buildings a wild mob clamored, holding up silver coins and notes, shouting the one word, "water, water."

Call for Ambulances

According to rumors, the Italian troops had forced the River Isonzo and entered the coveted Austrian city of Gorizia. Confirmation of this was obtained when one of the ambulances picked up two cavalry officers in the wrecked village of Lucinico who were still wet from their ride across the river. On the following day, Aug. 9, infantry moved up in a steady stream to cross the river and take possession of the captured positions on the other side. Toward evening of that day an urgent call was received to cross the river and evacuate wounded cavalry lying in the city.

Four cars were selected, two of them being light Ford ambulances which it was believed might pass where the heavier cars would fail to get through. It was an exhilarating experience to travel over a road which for months had been "No Man's Land," and after that to enter country which only the day before had been in the hands of the enemy. Just at dusk the long, broad iron bridge across the Isonzo river was reached.

Tractors hauled the heavy artillery into position on the mountainous Italian front. Those shown here are Fiats

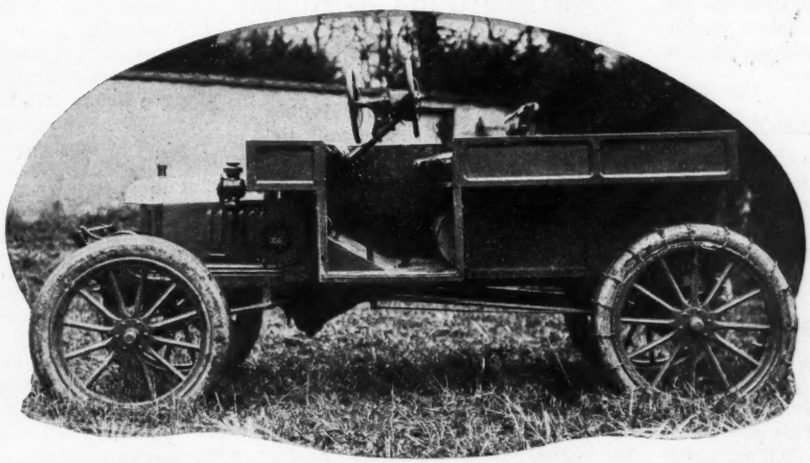
Parallel with the iron bridge was a wrecked railroad bridge across the river, and at the Italian side the final arch crossed the road parallel with the stream and formed a deep gallery which had been employed by the Austrian staff as an ideal natural dug-out. The tunnel being of considerable length, and its roof at least 30 ft. thick, it was only necessary to sandbag the ends to make it a place in which the staff could sit out the most severe bombardment.

But by a daring exploit, the Italians crossed the river both above and below this point, thus isolating the Austrian staff, which explains why the iron bridge was still standing when the Italian infantry moved up to get into the city on the opposite bank. But although standing, the bridge was in a very precarious condition. The approach was blocked with munition supply columns and field artillery. Leaving the ambulances on the bank and going ahead, it was found that several mule carts had dropped through the holes in the bridge to the river below and that other mules had only just been saved by hastily cutting the traces as the cart began to drop. So great were the difficulties that the officers in charge of the artillery supply columns had abandoned the attempt of crossing the bridge but instead were unloading from the carts and reloading beyond the gaps. The artillery horses had been unharnessed and each gun was manhandled across the shattered bridge.

Holes Every 10 Ft.

Although there were holes every 10 ft. on an average, and at one place two-thirds of the bridge had been shot away, leaving a narrow passage with crumbling sides, although the dead bodies of the soldiers killed in the first passage that morning had not been cleared away, and although it was known that in the darkness a single false step might be fatal, it was decided to attempt to cross with the cars. A Ford touring car loaded with medical supplies went first, moving ahead inch by inch, a small group of men in front and behind ready to give assistance if the treacherous surface should fail. With infinite care it was got across safely. Then followed a second Ford. After that the two big ambulances, Buicks, attempted the tortuous and dangerous course. No outside help could be of any assistance to us just here.

(*Concluded on page* 32)



Double steering Ford used for hauling artillery over broken country

To Push Aircraft Plans

Federal War Industries Board Will Supervise Buying and Transportation

Organization Will Decide Priority of Manufacture

WASHINGTON, D. C., Aug. 3—The new federal war industries board appointed by the Council of National Defense to supervise buying and to decide priority of manufacture and shipment will handle the new question of providing the supplies and the transportation facilities for the carrying out of the great aircraft building program now under way. It is expected to result in immediate and important adjustments of problems which up to this time have faced manufacturers of many articles vital to the prosecution of the war, one of which is tractors.

The creation of the board does away with the general munitions board. Frank A. Scott remains chairman, and the duties of the munitions board are taken over by the new organization.

Little doubt is felt but that materials needed for the production of airplanes will be given priority in shipment over other materials for less important purposes and that the long-delayed furnishing of materials for the making of tractors also will be rushed. The normal output of tractors for farm purposes alone during the calendar year, Jan. 1, 1917-Jan. 1, 1918, according to H. L. Horning, representative of the tractor interests of the co-operative committee on automotive transport of the Council of National Defense, should be at least 50,000, but Mr. Horning expects it to be at least 30 per cent short.

DE PALMA MAY AID

Chicago, Aug. 7—The morning newspapers here have it that Ralph de Palma is to take up work for the government testing airplane engines. This rumor is unconfirmed, but credulence is lent it since J. G. Vincent, vice-president of engineering for the Packard, is engaged as a consulting engineer in the United States aviation corps for the duration of the war. De Palma has had much to do with the development of the Packard airplane engine, it is said. He also used one in his new twin-six racing car this season.

GLIDDEN IS COMMISSIONED

Washington, D. C., Aug. 3—Charles J. Glidden, originator of the Glidden motor tour and an old time balloonist, has been commissioned in the aviation section of the Signal Corps. Glidden was among the first to tour around the world in a motor car.

AIRSHIP PLANT PLANS HELD UP

Toledo, Ohio, Aug. 3—Plans for the airplane motor and assembly plant of the Curtiss Aeroplane Co. in Toledo have been held up for thirty days. This announcement was made by John N. Willys, president. The unsettled conditions at Washington are responsible for the delay, and it is possible that the larger amount of Curtiss planes will be constructed in the Buffalo plant.

The Willys-Overland Co. will continue the manufacture of battleplanes, and Mr. Willys said he expected to turn out 3000 of them here the first six months of next year. At the Buffalo plant, Mr. Willys says, the Curtiss company expects to turn out approximately half the government's needs. Already contracts which will mean more than $200,000 annually have been awarded to the Curtiss company.

ABANDON RACING FOR YEAR

Detroit, Aug. 6—In addition to the Hudson Motor Car Co., whose withdrawal was announced last week, the De Palma Mfg. Co. has announced it will withdraw from racing for the balance of this year. Several Hudson drivers, including Ralph Mulford, Ira Vail and A. H. Patterson, are to get their own cars and enter them in the Army and Navy Sweepstakes at Cincinnati in September.

TWO GET FOREIGN ORDERS

Cleveland, Ohio, Aug. 6—The White Motor Co. has an order from the French government for 1500 trucks; in addition large orders from the United States government, and can operate at full capacity for the next eighteen months on orders now on hand.

Piqua, Ohio, Aug. 6—The Troy Wagon Works has received a contract from the French government for trailers, making it necessary to operate the plant day and night for the next eight months, and possibly for a whole year.

PRICE NEWS

Detroit, Aug. 6—Chevrolet panel delivery cars have been increased by the Chevrolet Motor Co. from $640 to $740.

Detroit, Aug. 6—The Maxwell Motor Co. will increase the prices of the touring cars and roadsters from $665 to $745, beginning today.

Cleveland, Ohio, Aug. 6—The Grant Motor Car Corp. has increased the price of its car from $875 to $950, effective Aug. 1.

Indianapolis, Ind., Aug. 4—After Sept. 1 prices on the Cole cars will advance. The amount has not been announced.

Air Board to Co-ordinate Army and Navy Aviation

WASHINGTON, Aug. 6—Special telegram—An air board, a civilian intermediary between the war and the navy departments, it is now expected, as a result of recent legislation, will take the place of the aircraft production board and will continue to give attention to the production end of aircraft activities.

From the present membership of the aircraft production board will be made up the personnel of the air board, it is now indicated, with Howard E. Coffin as chairman of this board. As suggested heretofore in these columns, E. A. Deeds and J. G. Vincent will enter the aviation section of the signal corps as majors, as also will Sidney Waldron.

Motor Tax Is Individual

Senate Finance Committee Retains Graduated Car Scale for Owners

Excess Profits and Postage Rates Are Changed

WASHINGTON, Aug. 6—Special telegram—The senate finance committee, in a report on the revised war revenue bill, explains the graduated tax on motor cars owned by individuals, as published several weeks ago, instead of a gross tax upon car manufacturers, as was at first considered. This was retained in the bill, because investigation showed that over 80 per cent of the manufacturers were making very small profits.

As to the elimination of the 16 per cent flat tax on excess profits, the report says a graduated tax beginning with 12 per cent and reaching 50 per cent at the highest was considered fair, carrying out the idea of taxing war profits. A 10 per cent tax upon undivided corporate incomes was put into the bill—a reduction from 15 per cent.

The bill also provides for an increase of one-fourth of 1 per cent a pound in second-class mail rates, and a 5 per cent net profits tax against publishers on profits over $4,000 annually.

Q. M. C. BUYS 150 MORE TRUCKS

Washington, Aug. 6—Special telegram—The Quartermaster's Corps of the Army has awarded contracts for thirty 1½-ton trucks, price not made public, to each of the following motor truck companies: Dort, Gramm-Bernstein, Selden, Garford, Velie.

WHITE RETURNS TO CADILLAC

Detroit, Aug. 6—D. McCall White, who resigned as chief engineer of the Cadillac Motor Car Co. during the last few days of the Leland administration, has returned to his old office at the request of R. H. Collins, the new president. Following Mr. White's resignation no chief engineer was appointed and his old organization was continued, except that he was not present to head it. Under these circumstances he virtually succeeds himself and continues with his own policies. During Mr. White's temporary absence from the engineering chair of the Cadillac company he has been acting in a consulting capacity to all the General Motors sub-organizations under the leadership of W. C. Durant.

UNITED STATES TRUCK EXPANDS

Cincinnati, Ohio, Aug. 6—The United States Motor Truck Co. increased its business 1000 per cent in the past year. The company, which a year ago had a production of ten trucks a month, now turns out 100 each thirty days and is arranging for a larger business. A progressive assembly plan is to be installed to replace the present group assembly and a building two stories high and 490 ft. by 90 ft. is to be used for

this purpose. The company now employs 250 men as compared with 85 a year ago. Preparations for expansion include the purchase of two city blocks on which new buildings will be erected, and several new railroad shipping docks to allow for better transportation. The plant is located next to three railroads and the Miami river, and in consequence is particularly favored as regards transportation.

Plans and specifications are now in process of completion for trailer manufacture and the company anticipates that it will enter into this branch of the industry early in 1918.

At this time the plant covers 353,000 sq. ft. of floor space and includes a body-building department, where the drivers' cabs and metal bodies are made, machine shops, assembly floor and stock floor, each 420 ft. by 100 ft., besides a large office building. A wise contract allowed the company to purchase $500,000 worth of steel at prices so profitable that it could now sell the steel stock at a profit of $310,000. The stock rooms also contain $450,000 worth of stock materials and parts.

The plant is located in mountainous country which allows for severe testing and the company has extended an invitation to other truck makers to use its facilities and testing roads for all trucks manufactured for the government.

LELANDS BUY FACTORY

Detroit, Aug. 6—Henry M. Leland and his son, W. C. Leland, have purchased the plant formerly occupied by the Rands Mfg. Co. and will use it for airplane manufacture for the government. Definite announcement with regard to the plant and future plans will be made soon.

RACES AT SHEEPSHEAD BAY

New York, Aug. 3—A race meet is being planned by W. H. Wellman for Sheepshead Bay speedway Aug. 18. No application for a sanction from the A.A.A. has as yet been made, but it is said a 100-mile sweepstakes will be one of the races.

Three Old Records Fall

Chalmers Sets World Marks for 24-hr., Hour and 10-Mile in New York

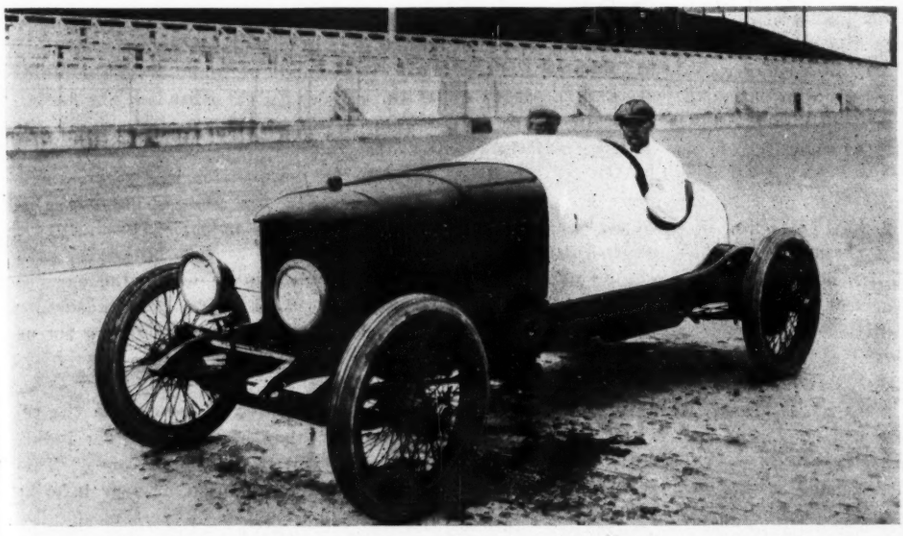
Dawson Is Relieved Only 5 Hours in Long Grind

NEW YORK, Aug. 4—Three speedway records were smashed by a Chalmers Record speedster here on the Sheepshead Bay speedway. The car, which was driven by Joe Dawson, established a new world's mark of 1898 miles for 24 hrs., bettering the old mark of 1819 miles, made by Hudson last year, by 79 miles. The old 1-hour mark of 77 miles was bettered by 6 miles and a new 100-mile mark was made in 70 min. 45.98 sec., the old mark being 80 min. 21.40 sec.

The car practically made the distance between New York and Denver in the 24 hrs., averaging 79 m.p.h., without a single stop of the engine. Thirty-five min. and 35 sec. delay was caused by replacement of tires, oil, water, etc. Not a single repair was made to the engine. The average miles per hour for the 24 hr., excluding the stops, was 81.09. The actual distance traveled as ascertained by a surveyor was 1922.44, or 81.1 m.p.h.

There were twenty-two stops and with the exception of a change of one spark plug no mechanical work was done on the car. An attempt was made by the technical representative to keep an accurate record of fuel, oil and water used, but this was impossible owing to the sloppage each time the car tanks were filled. For this reason the record of stops shows only when these supplies were taken on, although the stop sheets indicate approximately how much of each was taken on.

The car used U. S. Royal Cord tires, ribbed treads. One tire, the left front, went through unchanged. There was one blowout. Two tires were changed on the rear wheel. Three tubes were pinched.



The Chalmers Record speedster which established new world's records on Sheepshead Bay speedway, Joe Dawson driving

The specifications in brief are: Bore and stroke, 3¼ by 4½; pistons, drilled aluminum with Burd rings; carbureter, Stromberg, double venturi; fuel feed, pressure from rear tank to cowl tank, gravity from latter to carbureter; ignition, Remy distributer and battery; starting-lighting, Westinghouse, two unit; spark plugs, AC with cooling flanges, located over inlet valves; gearset, three-speed; drive, two-joint shaft; rear axle, semi-floating with straight bevel gears, ratio 3 to 1; wheels, SRB wire balanced, Standard wheel lock; drivers, Joe Dawson, 19 hr., and Joe Gardham, 5 hr.

The car itself is a stock proposition at $2,500.

The hourly record is as follows:

Hr.	Miles	M.P.H.	Hudson mile-age	Stops, No.	Duration Min.	Sec.
1.....	83	83	77	0	0	0
2.....	163	80	154	1	1	32
3.....	242	79	233	1	3	45
4.....	324	82	308	1	0	45
5.....	404	80	389	1	1	21
6.....	484	80	463	1	1	48
7.....	563	79	542	1	2	35
8.....	645	82	616	0	0	0
9.....	725	80	698	1	2	10
10.....	801	76	770	1	1	05
11.....	878	77	850	0	0	0
12.....	957	79	923	1	1	50
13.....	1039	82	1004	0	0	0
14.....	1115	76	1078	1	1	45
15.....	1194	79	1158	1	1	15
16.....	1271	77	1233	1	1	55
17.....	1351	80	1310	1	1	55
18.....	1429	76	1382	2	1	46
19.....	1502	75	1461	2	4	06
20.....	1580	78	1532	1	1	37
21.....	1660	80	1597	0	0	0
22.....	1738	78	1669	1	2	0
23.....	1817	79	1740	2	2	07
24.....	1898	81	1819	1	0	27

NEW BUSES FOR CHICAGO

Chicago, Aug. 7—The success of the first line of motor buses in Chicago has been such that officials now plan to establish four new routes, the first of which will be operated on Michigan avenue, Grand, Oakwood, Drexel and Hyde Park boulevards, the start being made from Michigan and Randolph. This route will be open Nov. 15. There also will be a connecting line of service from Michigan avenue and Fifty-fifth street, and from Jackson Park, and another line that will go south on Michigan to Fifty-fifth and west to Loomis, south to Marquette road, and the southern terminal will be Marquette Park. On the North Side the route is to be extended and an express service is contemplated. The statement made by the company says that 1,000,000 passengers have paid fares in the last 100 days.

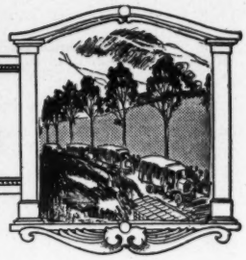
WOMEN MAY DRIVE TAXIS

Chicago, Aug. 7—A Chicago taxicab company has notified the woman's committee of the Council of National Defense that it stands ready to employ 1800 women drivers as fast as its men are called to war; consequently it may be a uniformed "Taxi-ette" who pilots the taxi through the streets of Chicago in the near future.

TRUSTEE FOR KENT MOTORS

Newark, N. J., Aug. 3—Louis G. Beekman, receiver for the Kent Motors Corp. of N. J., has been appointed trustee of the Delaware concern of the same name. The sale of the plant of the Kent Motors Corp. in Belleville, N. J., set for this week has been postponed for three weeks.

EDITORIAL PERSPECTIVES



Tractors in Peace or War

INTEREST of the nation this week rightly is turned to the tractor demonstrations at Fremont, Neb. War has given to the agricultural tractor an unusual importance, for it is through the tractor that those who have the successful prosecution of America's part in the conflict in charge hope to augment greatly the normal food supplies of the nation and those of our allies.

IT is a coincidence of more than usual significance that the most remarkable showing ever made of the success of heavy motors as fighting units in the performance of the tanks in the Allied drive on the western front should come at the moment of the opening of what promises to be the most remarkable showing of tractors in the arts of peace.

America Needs Roads

FROM time to time fear has been expressed that projected expenditures for road improvement throughout the country would be curtailed on account of war conditions. Judging from reports which cover the United States quite thoroughly there is not much reason to anticipate any great reduction in the proposed mileage of road improvements this year.

THIS was expressed most forcibly at a recent meeting of the Associated Good Roads Organization of Cook County and Illinois in a resolution which was adopted unanimously, pledging that organization to the heartiest endorsements of the plan of road building for Illinois which was enacted into a law subject to referendum vote by the last Illinois general assembly. This law provides for a $60,000,000 state bond issue for permanent main highways in Illinois, and a bill also provides for the increase of motor license fees to pay interest upon and to ultimately retire each bond. The statement of the organization as embodied in the resolutions is well worthy of adoption by good roads organizations throughout the country. It is as follows:

"AND whereas the Associated Roads Organizations of Chicago and Cook County, while fully appreciating the entire force of the nation, must be given directly to the creation of war activities, including the maintenance of ample supplies of food, clothing and munitions, realizes that better roads mean not only better health and living conditions but also a stronger national life in that they promote greater production of agricultural products and a wider distribution of them, as well as supplementing the steadily growing shortage in railroad transportation by extending the use of motor trucks, all of which is vital to the very maintenance of the war.

"BELIEVING, therefore, that the building of permanent hard roads is one of the foundation activities of the business life of the country and vital to national life and that all motorists as well as all other classes of loyal citizens of our state should give hearty support to the state road-building plan as embodied in the two bills passed by our state legislature and approved by the Governor of Illinois: therefore—"

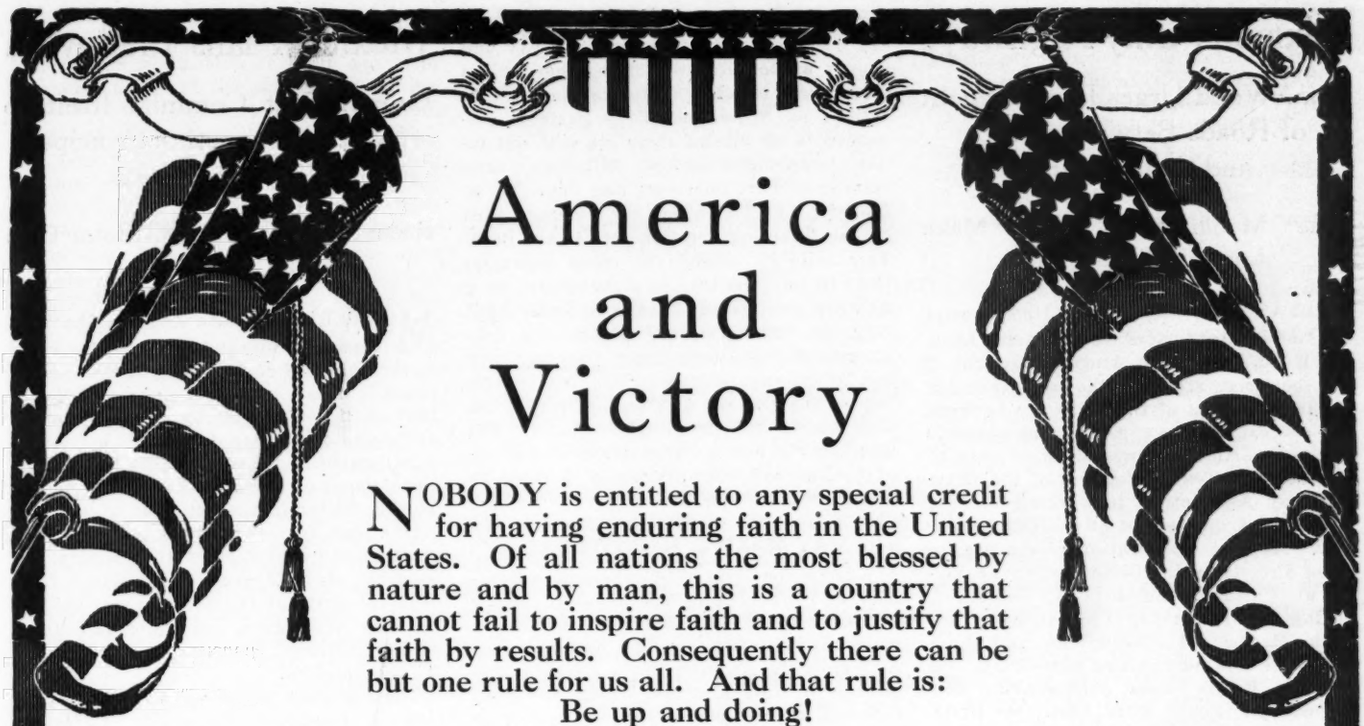
Aviation Mechanics Needed

NOW that $640,000,000 have been set aside for aviation in the war, the many phases of the real job ahead in training aviators and mechanics becomes more real. It is not a difficult problem to train aviators. True, it requires about five months of real strenuous work, but that readily can be done. Perhaps a greater problem than that of training aviators is that of training and organizing the great force of mechanics and tradesmen necessary to keep the aviators supplied with usable airplanes. For every aviator there are needed about six others who enter into the manifold work of keeping the planes in shape; in fact, many more than six are needed when the entire overhauling of aviation engines is considered.

TO get into the aviation portion of the army does not necessarily mean to become an aviator, but over a score of different kinds of tradesmen are needed in the aviation department. For example, watchmakers are needed to care for and repair the fine airplane instruments needed for recording altitude and making other observations. Tailors and sailmakers are needed to repair the canvas on the wings and control parts. Cabinet and furniture makers are needed for the intricate work of building the framework of the planes. Expert welders are needed to handle the autogenous welding outfits. In addition to these, who represent only a few of the many trades needed in the airplane service, are the many mechanics who must be familiar with every aspect of engine repair. An airplane engine generally runs 50 to 75 hr., after which time is is overhauled. This overhauling may be done right at the great aviation headquarters, 20 or 25 miles back of the trench lines, or it may be done at some great repair depot several hundred miles back of the front.

SUPPLYING these tens of thousands of mechanics and tradesmen for the airplanes will call for recruits from all trades, but the recruiting of mechanics will come largely from the motor car industry. These mechanics cannot be taken from the motor car and accessory factories, because all the workmen are needed in such. To-day it looks as if the motor car dealers and the garages and the repair shops from all parts of the country will have very largely to furnish the recruits for this service. At least two mechanics will be needed for each airplane engine in service, a first-class mechanic and a helper. These will be needed at the depots back of the trenches. Two others for each engine will be needed at the repair depots, where the engines are overhauled. This makes a total of almost four mechanics for each airplane. A hundred thousand airplanes fighting for us in France would mean an army of 400,000 mechanics.

THE best of these mechanics will have to come from the repair shops and garages and dealers of the motor car industry. Fortunately, these will not all be needed at once. This number is not available at present. Thousands of very inferior workmen will have to be trained to become expert mechanics. There is great need for motor car training schools where special courses on aviation mechanics can be given.



America and Victory

NOBODY is entitled to any special credit for having enduring faith in the United States. Of all nations the most blessed by nature and by man, this is a country that cannot fail to inspire faith and to justify that faith by results. Consequently there can be but one rule for us all. And that rule is: Be up and doing!

TOO many people accept without question the statement that this is a wonderful land and are totally unable to say why. Here are a FEW reasons why: from statistics compiled by the Winton Co.

In the sixteen years from 1900 to 1916, the population of the United States increased from 75,000,000 to 102,000,000. The gain was 36 per cent. In the same time the wealth of the United States increased from $88,000,000,000 to $187,000,000,000, and the increase of wealth per capita was from $1,165 to $1,965, a gain of 68 per cent. The meaning of this set of figures is that the growth in wealth far outstripped the growth in population. Or, put another way, although the growth in population has been splendid, the increase in wealth per person has been startling.

Taking the total wealth as representing 100 per cent, we find that the total wealth of the entire British Empire, spread all over the globe, is equal to only 70 per cent. The wealth of Germany is only 43 per cent. The wealth of France is only 27 per cent, of Russia 21 per cent, of Austria-Hungary 13 per cent, of Italy 10 per cent.

The United States could buy out ten countries like Italy, five countries like Russia, two and a half countries like Germany. And it could buy out the entire, globe-circling British Empire, and still have 30 per cent of its wealth left over.

The average family in Austria-Hungary gets $715 per year. The average family in Germany gets $970. The average French family gets $1,000. The average British family gets $1,368. What does the average American family get? Well, nearly as much as a German or a French family combined, or $1,800.

England has 22,000 persons who pay income tax on more than $5,000 per year. The United States has 80,000 such tax payers—nearly four times as many.

Still more astonishing are the figures covering the bigger incomes, annual incomes of $20,000 or more. England reports 1,950 such incomes. Against this figure the United States reports more than fifteen times as many; to be exact, 30,857!

Back of its manufactures, back of its human activity, the thing that makes the United States the marvel of the world, the banker for the universe, the hope of the allies, the victor in the great war, the one country of all countries worth living in; the thing that is responsible for all this is the abundance that nature has poured into our laps. Do you know, has it ever occurred to you, could you tell the man who doesn't know, that the United States leads the world in:

Corn,	Cattle,	Copper,
Wheat,	Coal,	Aluminum,
Oats,	Petroleum,	Zinc,
Cotton,	Pig Iron,	Silver.
Tobacco,	Steel,	

But go into a little detail about these fourteen resources of nature. Argentina is the second greatest producer of corn; the United States produces 9 bu. of corn to every single bushel produced in Argentina.

Russia is the second greatest producer of wheat. For every bushel of wheat that Russia grows, the United States grows 1.21 bu.

In oats the United States produces 1.53 bu. for every bushel produced in the second greatest country, which is Russia again.

British India ranks second in cotton and tobacco. The United States outproduces that country 3.79 times in cotton, and 2.36 times in tobacco.

In cattle the United States grows 1.8 head to every single head grown in the second greatest country, which once more is Russia.

In petroleum, yet again, Russia ranks second, but for every barrel of oil that Russia produces, the United States produces 4.1 bbl.

The United States leads in coal by 1.87 tons to every ton the United Kingdom produces.

In pig iron and steel Germany ranks second. The United States' lead over Germany's production is 2.58 to 1 in pig iron, and 2.46 to 1 in steel.

Copper, another prime necessity in war, gives Japan second place. But the great Lake Superior deposits give the United States such a tremendous supply it can deliver 8.26 tons every time Japan contributes 1 ton.

The United States produces 2.48 lbs of aluminum to every pound that comes out of the ground in France, the second biggest producer.

In zinc the United States outproduces Germany 1.11 to 1, and in silver it is first by a very slight margin over Mexico, 1.02 to 1.

Are statistics dry reading? Well, if figures like these do not appeal to the patriotism of Americans and warm their hearts; if figures like these do not spell prosperity and peace, it would be difficult to say what would. Wars can't be won on wind, nor prosperity spread without goods to sell. In these facts and figures you will find that America has the goods, the most vital goods to spread prosperity and to end the war.

Dixie an Army Highway?

Gen. Wood Urges Improvement of Roads Between Camps and Cantonments

Nine Mobilization Points Make Logical Military Path

SAVANNAH, Ga., Aug. 3—Upon receipt of several letters from General Leonard Wood, head of the Army department of the southeast, stressing the importance of the improvement of the highways between the several army camps and cantonments in the department, Judge M. M. Allisen of Chattanooga, Tenn., president of the Dixie Highway Association, is working for the immediate improvement of the Dixie highway. As nine mobilization camps are located directly on the Dixie highway, namely, at Chicago, Indianapolis, Louisville, Covington, Nashville, Chattanooga, Atlanta, Macon and Jacksonville, and three camps are located in cities adjacent to the highway, Battle Creek, Jeffersonville and Augusta, it would seem that the Dixie highway is destined to become the military road of the east coast division.

General Wood's appeal for roads suitable for the transportation of troops and supplies already has been effective, since every county between Chattanooga and Jacksonville is either at work on the road or preparing to start work. The improvement of practically all of the mileage of the Dixie highway is highly important, according to the request of the Secretary of War that through roads be completed for the use and movement of troops and the transportation of food products and supplies. A large part of the mileage of the highway is covered by the urgent suggestion of General Wood that the roads connecting the various cantonments should be put in good condition for service.

At present along the Dixie highway there are training camps at Fort Sheridan, Chicago, and Fort Benjamin Harrison, Indianapolis; a mobilization camp for the draft army under construction at Louisville, Ky.; a quartermaster's depot at Jeffersonville, Ind., across the river from Louisville; training camps and military cantonments at Chattanooga and Atlanta; a mobilization cantonment for the national guard at Macon, with still another camp at Augusta, Ga.

Jacksonville, Fla., also will get a cantonment, it is said. General Wood has emphasized the importance of the improvement of the link of the highway between Savannah and Jacksonville, as well as the construction of a connecting road along the coast from Charleston to Savannah. Savannah will be a concentration point for supplies and men destined for overseas service.

U. S. CALLS ROAD MEN

Chicago, Aug. 3—The government is taking an active interest in improvement of the roads to the military and naval training stations and is bringing pressure to bear on local authorities to see that such work is rushed. An instance of how civilian good roads organizations and city and county authorities are got together by the government officials to improve road conditions at Army and Navy posts is evidenced in an official summons sent out today by Colonel W. J. Nicholson, commander at Fort Sheridan, and Capt. W. A. Moffett, in charge of the Great Lakes Naval Training Station at Lake Bluff. This calls all officials of roads organizations in this territory to a conference on a military road from Chicago to Lake Bluff Aug. 11. The proposed highway is considered of prime importance from military and naval standpoints, as without it it is impossible to move supplies by truck from Chicago to the training stations. The meeting will be the culmination of a series of preliminary conferences of a more or less informal character.

MAY MAKE L. H. POSTROAD

Washington, Aug. 6—Congressman Brodbeck of Pennsylvania has introduced a bill in the House of Representatives that would make the Lincoln highway a national postroad from the Atlantic to the Pacific. The passage of this measure, which has been referred to the committee on postoffices and postroads, would make possible the immediate improvement of the Lincoln highway from coast to coast, a point not to be overlooked in the light of probable military needs. Such a legislative enactment is welcomed by highway supporters from another standpoint also. It would free the Lincoln highway of toll charges to touring motorists.

CANADA MAY LIMIT MOTORING

Ottawa, Can., Aug. 3—Joy riding and long motor trips in Canada may be eliminated if the fuel controller carries out plans he has under consideration. This drastic course would be to conserve the gasoline supply for the needs of the armies in England and France, and, if necessary, industries in Canada, particularly western agriculture, which is beginning to absorb vast quantities of gasoline for needless motoring.

WATCH WHEEL TAX

Chicago, Aug. 3—To assure proper application of motor taxes to street improvement and road work requires constant vigilance on the part of those interested in the improvement of touring conditions. This is particularly true where wheel tax is levied in cities with the avowed purpose of street improvement. Motorists in other cities would do well to follow the example of the Associated Roads Organizations of Chicago and Cook County which, at a meeting last night comprising representatives of such varied interests as preachers, bankers, truck growers and the motor trade, took active steps toward keeping a close check on the expenditure of the Chicago wheel tax on street improvement. The meeting last night pledged itself to get strongly behind the education for the $60,000,000-bond issue for road improvement throughout Illinois, particularly in view of the national necessity for good roads towards the furtherance of success in the war.

Mexico Plans Highways

Government Commits Itself to System Connecting Principal Cities and Ports

Recent Import of 5000 Motor Cars an Incentive

MONTEREY, Mexico, Aug. 3—The Mexican government has committed itself to the policy of constructing at the earliest possible time a system of modern highways that shall connect all the principal cities and ports of the country. This movement was inaugurated several weeks ago by the Department of Communications and Public Works, following the outlining of the tentative plan for construction and improvement of the highways of the country. A meeting of good roads enthusiasts from different parts of the country was held in the city of Mexico, and the organization of the National Highway Association of Mexico resulted.

The honorary president of the association is President Venustiano Carranza. The secretary is Jose H. Delgardo, who holds the position of Mexican consul at Nogales, Ariz. The tentative plans call for the construction of several trunk highways, the first to run from the capital to Tepic on the west side via Guadalajara, thence up the coast to Guaymas, thence north to Nogales.

The second proposed highway which is to be built under the direction of the National Highway Association of Mexico, with the financial assistance of the federal government and the different states along the proposed route, is to run from the City of Mexico to Laredo on the Rio Grande border, a distance of about 800 miles. A branch of this road will be built from Monterey to Torreon and from Torreon north to Eagle Pass and south from Torreon to Durango. This second highway will be routed through Toluca, San Luis Potosi, Saltillo, Monterey and smaller towns. It also is proposed to build a modern highway to run from the City of Mexico to Vera Cruz, following the ancient highway that was built by Cortez about 400 years ago. There are still remnants of other ancient highways which were built during the days of Conquistadores, and wherever it is possible these old camino reals, or main highways, will be rehabilitated and put to modern use. The import during the last two months through the ports of entry of Nogales, Agua Prieto, El Paso, Eagle Pass, Laredo and Brownsville and other smaller international gateways of more than 5000 motor cars is serving as a stimulus for the good roads movement.

ARIZONA TAKES MOTOR CENSUS

Phoenix, Ariz., Aug. 3—A comprehensive motor car census, covering the entire state of Arizona, has been completed for the Arizona Council of Defense. The census gives the make, capacity and name of owner of every motor truck and touring car in Arizona, all cars of five-passenger capacity and up being listed. With the

data included in the census, there is now on file with the defense council complete information as to what cars are available in every section of the state for volunteer service of any sort that may be required. Dealers played no small part in compiling the census, the motor truck census being handled entirely by R. D. Canfield of the motor truck department of McArthur Bros. Wesley Hill, proprietor of a Globe-Phoenix motor stage line, was in charge of the work of listing the touring cars. Both Canfield and Hill are members of the transportation committee of the defense council. The census was compiled under the direction of Colonel Epes Randolph, chairman of the transportation committee. Car owners in Arizona have responded generously to the calls of the defense council for cars to be used in making a crop survey of the state. In the Salt River Valley motorists furnished between fifty and seventy-five cars for this work, supplying their own gas and often driving the car in person. Cars were also furnished for transporting the members of the boys' food battalion, which is engaged in relieving the shortage of labor in the cotton fields. Many women furnished their cars for this purpose and drove the cars themselves.

K. C. FORMS HOME MOTOR CORPS

Kansas City, Mo., Aug. 4—Kansas City motor car owners have found a definite service they can render to national defense. It is the transportation to and from guard duty of the volunteer home guards who are to take the places of the National Guard, when the latter leaves the state.

The motor detachment handles the transport problems of the regiment. The Provisional National Guard began guard duty Aug. 1, at which time the National Guard was withdrawn from this duty preparatory to going to Fort Sill. The guard for the first few days was acting unofficially, as it had not been mustered into state service. One company is assigned to duty each day, the men going to the reservoirs, pumping stations and critical points on the flow lines of the waterworks.

The members will serve, if the estimated 200 cars are obtained, one day a week. The regular service will consist of receiving from headquarters a list of guards to gather on the following day; calling for these guards at their homes; transporting them; bringing back the relieved guards, and transporting them to their homes. Usually the motor car owner will leave his home at 5 o'clock in the morning; gather the men and have them at headquarters at 5.30; take them to their guard posts by 6.30; transport the relieved guards to their homes, and be at his own home by 7.30. The entire day's service—once every week—takes only about 2½ hr., often less.

FORD WITHDRAWS AGENCIES

St. Louis, Mo., Aug. 6—Since Aug. 1 the Ford Motor Co. has withdrawn permits from six of the sixteen agencies in this city. The survivors are: Ayres Auto Co.; Bilgere-Kavanaugh Auto Co.; Carondelet Motor Co.; Lafayette Motor Co.; Mendenhall Motor Co.; Tevis Motor Co.; Rieflin-Vigar Automobile Co.; Walsh Motor Co.; Johnson Automobile Co.; O. E. Haupt Motor Co.

More Oil from Mexico

Petroleum Discoveries Are Expected in Lower California After Investigation

Leading Companies Work to Facilitate Handling Fuel

WASHINGTON, Aug. 5—According to official advices from the Mexican government the petroleum production situation in that republic is encouraging and satisfactory. These advices state that some of the leading petroleum companies in the Tampico district are constructing at their own expense many miles of wagon road, paved with asphalt, for the benefit of their business operations. The New England Fuel Oil Co. has recently brought in a well in the Tampico district at a depth of 600 m. which flows 800 cu. m. of petroleum daily. A valuable discovery of petroleum measures has been made on the island of Guadalupe, in the Pacific ocean, which had hitherto been regarded as practically worthless from an oil standpoint. The Transcontinental Petroleum Co., in which foreign capital is invested, has been given permission to maintain for five years a wharf on the bank of the Panuco river, in Vera Cruz, for the purpose of handling its products.

Other activities noted include the preparation of maps of the petroleum regions of the republic, which will show exactly what lands are the property of the government, and will furnish a guide for the granting of concessions for the exploitation of the oil measures in the future; the total shipment from the Tampico district during June was 3,541,296 bbl. of petroleum, of which 2,719,520 went to the United States and 821,776 to other points, Porto Rico, Argentina, Canada, Uruguay and Chile. A total of 298,594 bbl. were retained for home consumption.

Investigations recently made, it is pointed out, indicate that valuable deposits of petroleum and in large quantities will be found in lower California, in territory heretofore considered entirely nonproductive from an oil standpoint.

800,000 FORDS EXPECTED

Detroit, Aug. 3—The Ford Motor Co. has been producing cars at a rate of more than 3300 a day for the last sixty days, and it is expected that the report for the last fiscal year, which may be out within the next thirty days, will show that nearly 800,000 cars have been sold as compared with 533,921 for the fiscal year ending July, 1916. The company is shut down for its usual inventory and machinery repair period. It is operating with a force of 25,000 men, 11,000 have been laid off temporarily. Aug. 1 the company was 80,000 cars behind orders with no prospects of catching up.

NEW PATHFINDER TAKES PLANT

Indianapolis, Ind., Aug. 5—The Pathfinder Motor Co. of America, recently organized under the laws of New Jersey with a capitalization of $2,000,000, has taken formal charge of the plant of the Pathfinder Co. of Indianapolis. Officers and directors of the new company are: President, Charles McCutcheon, Indianapolis; vice-president, Fred C. Dorn, Cleveland, Ohio; secretary-treasurer, Paul H. White, Indianapolis; directors, C. J. Root, chairman, Crawford Fairbanks, A. C. Brown, William A. Umphrey and George H. Mesher. Although not announcing the extent of its production, the company announces that production will be increased of present Pathfinder models and that a line of motor trucks will be manufactured.

ONE STANLEY CHASSIS ONLY

Newton, Mass., Aug. 3—The Stanley Motor Carriage Co. will produce one chassis size only hereafter, the standard 130-in. wheelbase model made for the last three years with three-, five- or seven-passenger bodies.

METZ MEN TO MEET

Waltham, Mass., Aug. 4—Motor car dealers from all over the United States east of the Mississippi river, have been invited to attend a convention at the Metz factory Aug. 16 to view the new line of truck units and tractors the company is building. Two types of the Metz 1-ton truck units will be exhibited, chain and universal transmissions. The 2 to 4-ton units will be displayed. These are made to fit any passenger car. Also a front end made to fit any truck unit on the market will be shown. The Metz Convertractor will be on view too. The program will include speeches by prominent Massachusetts men, a trip on the Charles river, banquet and sports.

CHEVROLET SALES DOUBLE

New York, Aug. 3—Sales during the first six months of this year for the Chevrolet Motor Co. have doubled the corresponding period of 1916 and nearly equal the whole of 1916. The report shows sales for the half year of 65,235 cars valued at $29,704,773. This compares with 32,514 valued at $16,338,585 for the first half of 1916 and 69,690 cars valued at $31,877,375 for the whole of 1916.

G. M. PROFITS $28,750,000

New York, Aug. 3—The General Motors Co. shows profits of $28,750,000 in its report for the eleven months ending June 30, 1917, as compared with $24,862,198 in 1916 and $11,686,281 in 1915. Gross sales were approximately $185,750,000 compared with $145,159,746 and $85,801,189 respectively in the two previous years. While the month of July will show a light falling off in volume due to the completion of current schedules and closing down for inventories, it is expected that profits for the twelve months will exceed $30,000,000.

INTERNATIONAL $9.10 A SHARE

New York, Aug. 3—Earnings during the first half of the current year for the International Motor Truck Corp. were in excess of $400,000 after interest charges, equivalent to about $9.10 a share on $4,243,771 7 per cent cumulative first preferred outstanding. This is at the annual rate of $18.80 a share. The financial position is probably the best in the company's history,

cash being in excess of $1,300,000 and, with notes and accounts receivable, quick assets amount to more than $2,750,000. Accounts and notes payable are about $1,800,000, leaving net quick assets close to $950,000. The accounts and notes payable item is made up mainly of $1,500,000 two-year notes, recently sold. The inventory shows raw material and finished and unfinished trucks amounting to approximately $3,750,000. This added to net quick assets of $950,000 leaves working capital of about $4,700,000. Shipments the first half were about 625 trucks greater.

WILLYS-OVERLAND AGAIN SCORES

Toledo, Ohio, Aug. 3—Figures just compiled in the retail sales department of the Willys-Overland Co. show July sales amounted to $13,611,775, an increase of $2,500,000 over the company's previous high water record established in June of this year. Willys-Overland branches, distributors and dealers reported sales of 16,572 cars during July. Past experience, however, shows that reports for about 10 per cent of retail sales are not turned in to the factory by the dealer. Although working at top speed the Toledo factory has been unable to keep up with sales. In July 2500 more cars were shipped than in July, 1916.

SAXON GETS ADDITIONAL CAPITAL

Detroit, Aug. 6—The Saxon Motor Car Corp., which has been financing for additional cash working capital, has completed its negotiations successfully. Saxon business has been prosperous during the last month and shows a great improvement over that season which directly followed the declaration of war.

Experts Will Aid U. S.

Engineers Volunteer for Army Truck Design in Washington for Indefinite Period

Fifteen or Twenty Enough to See Work Through

WASHINGTON, D. C., Aug. 3—Though Quartermaster General Sharpe has summoned fifty engineers to Washington to aid in completing the design of the standard military motor trucks it is not expected that more than fifteen or twenty men will be required to see the work through. Capt. William M. Britton began making arrangements for the accommodation of engineers immediately after the meeting in Columbus, July 21, after which so many volunteered for service. Arrangements have been made for 100 or more draftsmen, tracers, etc., and many makers have offered their assistance. For instance, the Continental Motor Co. placed at the government's disposal its entire drafting-room staff and the equipment, and the offer was accepted promptly.

Rules of the quartermaster's department prevent expense allowances for the engineers who are to aid in this work, but the rate of pay has been fixed at $16 a day for each engineer, which more than pays expenses, working out to $4,800 a year. The engineers are to give just such time as they can spare from their business, but the draftsmen will be retained permanently as long as the job lasts. When the designs are completed it is planned to submit them to a large general conference somewhat of the nature of those held in Columbus, it being desired to obtain the maximum amount of constructive criticism before any actual manufacture is proceeded with.

The engineers and with work for which they have been called in the designing of the military trucks are:

Chassis

Kalb, Lewis B., Kelly-Springfield Motor Truck Co., Springfield, Ohio; Masury, A. F., International Motor Co., New York; Myers, Cornelius T., Detroit; Austin, Ralph W., Gramm-Bernstein Motor Truck Co., Lima, Ohio; Dorris, George P., Dorris Motor Car Co., St. Louis, Mo.; Taylor, Cecil, Republic Motor Truck Co., Alma, Mich.; Martin, A. H., Kissel Motor Car Co., Hartford, Wis.; Guernsey, Chas., Service Motor Truck Co., Wabash, Ind.; Rose, C. B., Velie Motors Corp., Moline, Ill.; Shumard, E. C., United States Motor Truck Co., Cincinnati, Ohio; Norton, W. T., Jr., Selden Motor Vehicle Corp., Rochester, N. Y.; Johnson, W. H., Dart Motor Truck Co., Waterloo, Iowa; Wemp, Ernest E., Denby Motor Truck Co., Detroit; Thomas, W. Owen, Thomas & Thomas, Detroit; Winther, M. P., Winther Motor Truck Co., Kenosha, Wis.; Wollensak, Arthur C., Sterling Motor Truck Co., Milwaukee, Wis.; Church, H. D., Packard Motor Car Co., Detroit; Younger, John, Pierce-Arrow Motor Car Co., Buffalo, N. Y.

Electrical Equipment

Conrad, F., Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Libby, A. D. T., Splitdorf Electrical Co., Newark, N. J.; Chryst, W. A., Dayton Engineering Laboratories Co., Dayton, Ohio; Bijur, Joseph, Bijur Motor Lighting Co., Hoboken, N. J.; Timmerman, A. H., Wagner Electric Mfg. Co., St. Louis, Mo.; Replogle, J. B., Remy Electric Co., Anderson, Ind.; Conklin, O. F., Remy Electric Co., Anderson, Ind.

Axles

(WORM)

Carlson, G. W., Timken Detroit Axle Co., Detroit; Laycock, A. M., Sheldon Axle & Spring Co., Wilkes-Barre, Pa.

(INTERNAL GEAR)

Russel, A. W., Russel Axle Co., North Detroit, Mich.; Fries, R. E., Columbia Axle Co., Cleveland, Ohio; Torbensen, V. V., Torbensen Axle Co., Cleveland, Ohio.

(DOUBLE REDUCTION)

Clark, Mr., The Autocar Co., Ardmore, Pa.; Masury, A. F., International Motor Car Co., New York.

Engines

Horning, H. L., Wisconsin Motor Co.; Milbrath, A. F., Wisconsin Motor Co., West Allis, Wis.; Ballough, Chas., Hercules Motor Co., Canton, Ohio; Hinkley, Chas., Hinkley Motor Co., Detroit; Weinhart, Chas., Continental Motor Co., Detroit; Broege, Chas., Buda Motor Co., Harvey, Ill.; Fisher, James, Waukesha Motor Co., Waukesha, Wis.

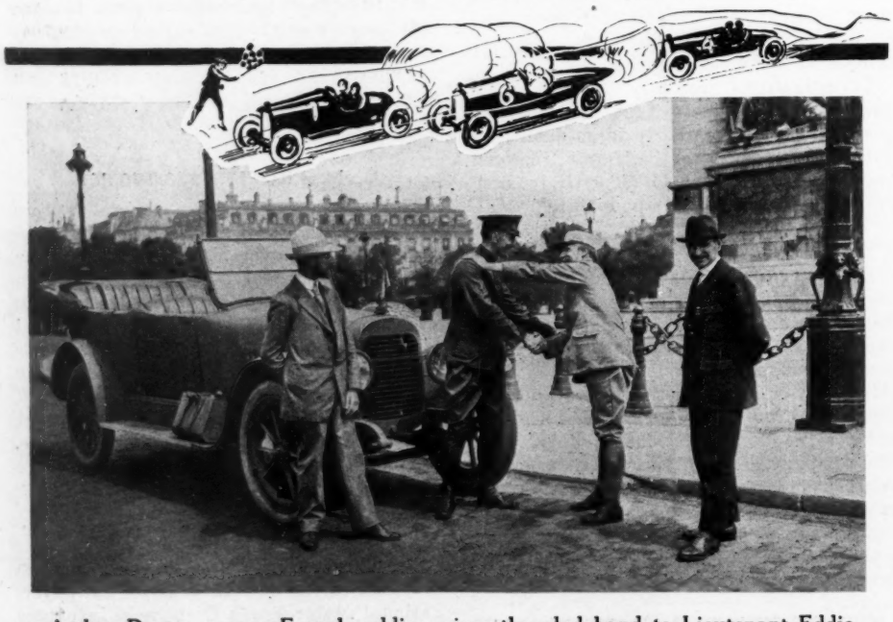
Springs

Newkirk, Walter M., William & Harvey Rowland, Inc., Frankford, Philadelphia, Pa.

General

Clayden, A. L., Engineering Editor *The Automobile and Automotive Industries.*

Old Enemies on the Track Meet as Allies on the Field



Arthur Duray, now a French soldier, gives the glad hand to Lieutenant Eddie Rickenbacher. Duray holds the distinction of traveling faster than any other man ever traveled by motor car—142.9 m. p. h. at Ostend in 1913. At the right is Jean Chassagne, holder of the 2-mile record at Brooklands of 118.9 m. p. h. At the left is W. F. Bradley, Motor Age's special war correspondent with the Allied armies

UTZ TO WASHINGTON

Cleveland, Ohio, Aug. 6—John G. Utz, director of engineering for the Standard Parts Co. and chairman of the standards committee of the Society of Automotive Engineers, has been ordered to appear in Washington to serve on the military board for the standardization of motor trucks. He will be the engineer in charge of designing trucks for the Quartermaster's department.

FORD TRACTOR COMPANY FORMED

Lansing, Mich., Aug. 3—Henry Ford & Son, Dearborn, Mich., manufacturers of the Ford tractor, have been incorporated with $1,000,000 capital, all of which is paid in. The concern is strictly a family affair and the 10,000 shares of $100 par stock are held as follows: Henry Ford, 3333; Clara J. Ford, 3334; Edsel Ford, 3333.

Farm Tractor Is Coming Into Own

Hundreds of Agricultural Engines to Show Worth at National Demonstration This Week

FREMONT, Neb., Aug 6—Farm tractors have felt the refining influence of motor car engineering; they are graduating from the strap iron and cumbrous castings of other days to lighter parts of alloy, steels, careful fitting and thoughtful design in the way of inclosing and combining the units—at the same time improving accessibility for adjustment and repair. Such is the impression to be gained in general from a survey of the hundreds of agricultural tractors gathered at the demonstration field of the third annual National Power Farming Demonstrations at Fremont this week.

This demonstration, which is scheduled to open today and which will continue until Friday, Aug. 10, is the one national demonstration of agricultural engines of the year. Last year and the year previous these demonstrations were conducted throughout the season on a circuit which comprised such farming centers through the Middle West as: Dallas, Tex.; Hutchinson, Kan.; St. Louis, Mo.; Indianapolis, Ind.; as well as Fremont. This year, the entire effort of the tractor men is to be concentrated at Fremont.

Forty-two Tractors

There are forty-two different makes of tractors to take part in the plowing trials, and thirty-six accessory companies are getting ready for the crowds that are expected to flock into the big accessory tent this week. The number of makers taking part at this demonstration shows the growth of the tractor movement when it is compared with the number of tractor and accessory exhibitors last year. The first demonstration in Fremont, in 1913, drew only fifteen tractors.

Actual plowing trials, which were scheduled to start today, are to be started tomorrow. This postponement was made necessary by heavy rain Saturday, which almost amounted to a cloud-burst and soaked the ground up to such an extent that it has not dried sufficiently. Most or all of the machines could operate in the 3000 acres to be plowed, but it would not be good for the land to plow it so wet. Saturday's rain was accompanied by a wind that almost completely wrecked the city of tents that has sprung up at the demonstration field. It is doubtful if all the tents will be up by noon today.

The management of the demonstrations estimates that there will be 500,000 persons in attendance during the week, and it is expected that the 1916 record of 60,000 in one day will be very much exceeded. This is six times the normal population of Fremont, and nearly every resident has thrown open his home to the visitors.

One of the chief features to be noticed in a survey of the tractors at the demonstration today is the general tendency to increase the traction surfaces of the steel horses. Whether or not the publicity given the success of the armored tanks in the European battlefields has been a factor, it is noticeable that there are more machines of the creeper type, like the caterpillar, this year. This continuous-belt idea can be arranged to give the maximum of traction surface on the ground.

There is the Holt caterpillar, whose design is credited with being the original of the British and French war tanks. The Bates Steel Mule, which last year had a single endless belt, has a newer design which is somewhat lighter and has two of the creeper belts and the Creeping Grip. The Cleveland tractor, which is the design of Roland White of the White Co., is a very small two-or-three plow machine with two endless belts and is creating great interest both on account of its originator and the numerous stunts of which it seems capable. It will almost stand on its tail and whirl around in its tracks.

Great tractive surface through the use of exceptionally wide wheels or drums characterizes the Gray and the Bull tractors. The same effect is procured, with added tractive effort, by the types which drive through four wheels. The latest of these is the Four-Drive tractor of Big Rapids, Mich. This not only drives but steers through all four wheels and has spent most of its time the last two days pulling cars and trucks out of the mud. This tractor shows the development in tractors from the farm-implement style toward the motor car style of design, having such features as Timken-David-Brown worm rear drive and Brown-Lipe-Chapin front drive, Waukesha engine, etc. The maker calls it "the Packard of tractors."

Three others, which come from factories closely associated with the motor car industry, also mark the trend to motor car design and materials. These are the Velie Biltwel, the Moline and the Case. The Velie is the new one of the three and is featured by the use of alloy steels in gears and shafts and by arrangement of parts which shows motor car engineering. Later models of both the Moline Plow Co. and the J. I. Case T. M. Co. show this trend.

The monstrous overgrown tractors of past years are not so much in evidence today. They seem to be giving way to smaller machines of more moderate power and weight. There is one eight-cylinder tractor. This is a Common Sense and uses a Herschell-Spillman engine.

PACKARD WINS ROCHESTER CLIMB

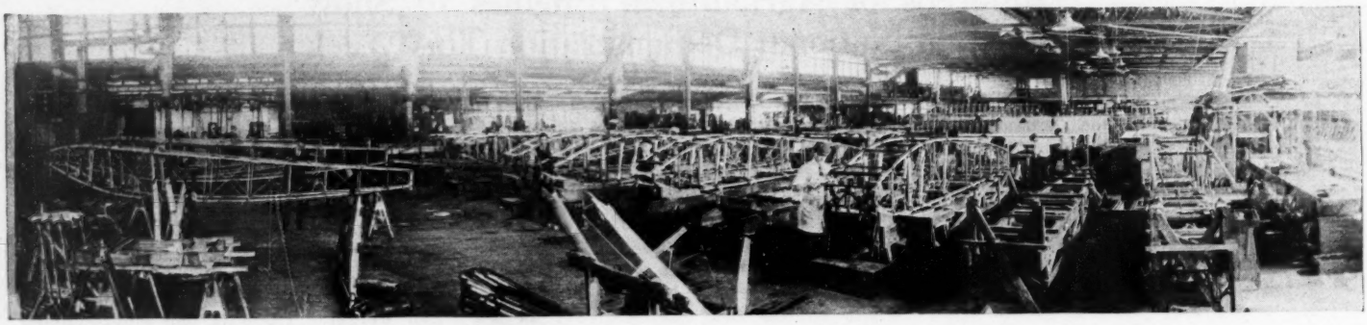
Rochester, N. Y., Aug. 1—A Packard driven by Fred Turner made the fastest time on the ½-mile hill at Livonia July 28, negotiating the ascent in 43⅖ sec. The hillclimb was held by the Automobile Club of Rochester. The average grade of the hill is 6 per cent. The next best time was 43⅗ sec., made by a Cadillac, driven by Henry Conolly for cars of 301 to 450 cu. in. displacement. The Packard was entered in the 451 to 600 cu. in. displacement class. A Maxwell, driven by C. L. Darling, won the event for cars of 161 to 230 cu. in., its time being 48⅕. A Hudson, driven by F. J. Lennox, made the hill in 44 sec. in the 231 to 300 in. class. The free-for-all was won by a Chandler, driven by Barney Cane, who negotiated the hill in 44⅘ sec.

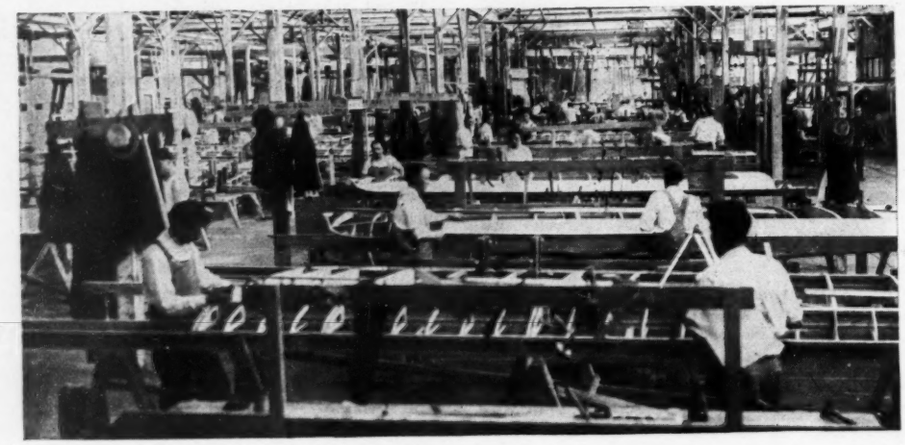
MOON LIGHT WEIGHT SIX

St. Louis, Mo., Aug. 4—A $1,000 six-cylinder car with a Continental engine is to be produced by the Moon Motor Car Co. during the coming season and is to be called the Moon Light Weight Six. It will have 32 by 3½-in. tires, a 3 by 4½-in. engine, and a body of the latest design, with high radiator and low windshield lines.

Kenneth Livingstone, son of the president of the Boy Scouts of America, operating Ford tractor on boy scout farm at Washington. The farm is part of Potomac Park

Building Uncle Sam's Air Squadron



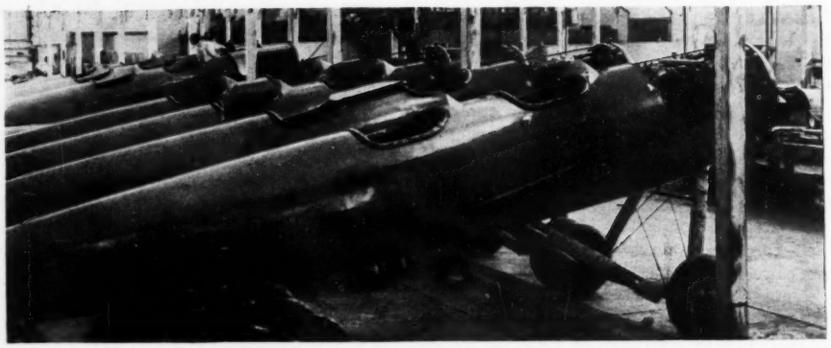


graph at the left and the four below it are views in this plant, the one at the left showing the construction of the wings. A study of this will show the progressive assembly, the wing in the foreground with the frame just being completed, the one immediately beyond it being covered and the next almost completely covered.

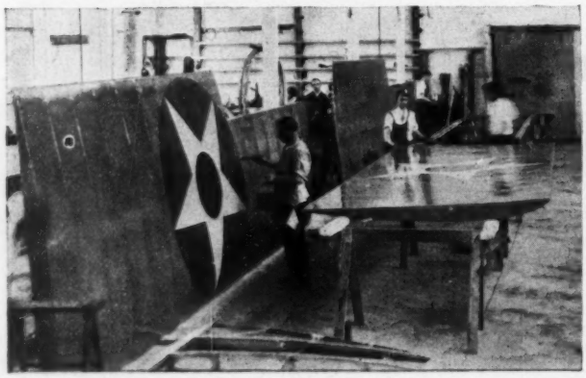
At the right is a flock of the great gasoline birds without their wings. These will be ready for the air when wings are attached and propellors fitted. Cock pits for two aviators are provided, or, when used as school planes, one for student and the other for instructor.

Of the two bottom photographs the one at the right shows the wingless machine undergoing motor tests. Note the soldier on guard, a part of the company that watches over the factory day and night. The photograph at the left is the final step in the preparing of the wing. Here the painter

Construction of America's Flying Fleet Is Pushed in Mammoth Factories



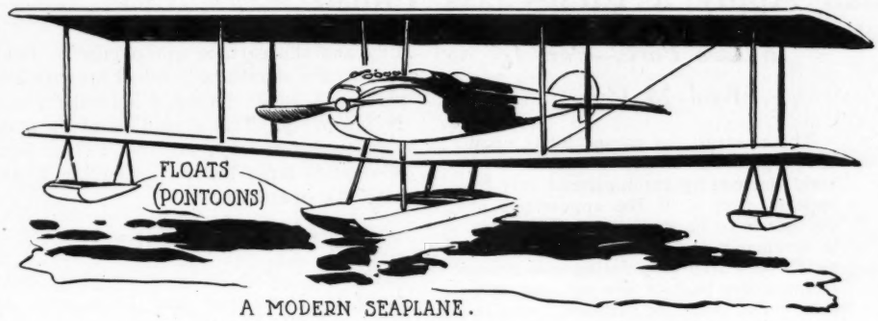
THOUSANDS of men are working day and night in turning out the vast fleet of airplanes which is to give America mastery of the air. The photographs on this page illustrate some of the steps in the construction of the planes. They were not all taken at the same factory, but are representative of all the aviation plants. The



photograph at the top of the page shows the fuselage assembly in the Curtiss airplane plant at Buffalo. This shows the framing of the main body portion.

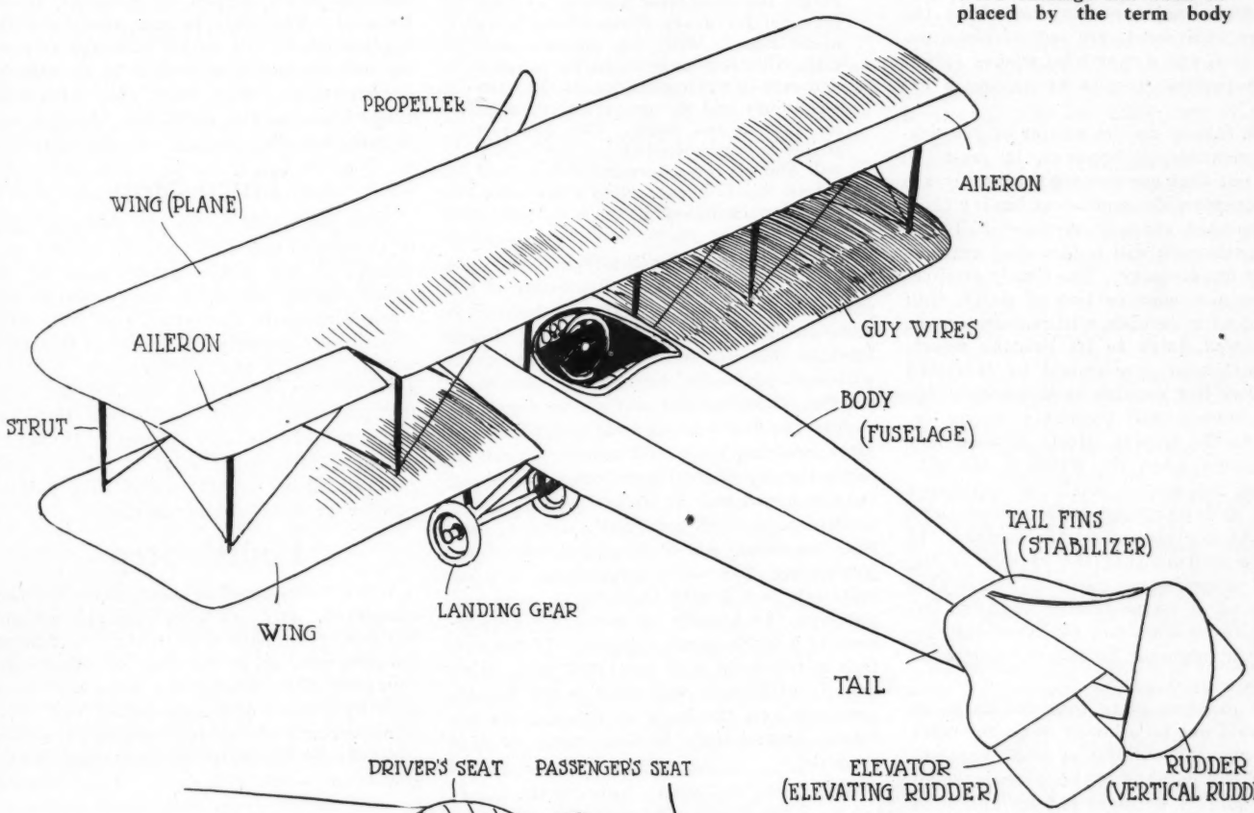
"Somewhere on Long Island" planes are being produced by the hundred. The photo- is marking the wings with the symbol of the American air fleet. Wherever this symbol is seen it means a U. S. airplane.

A. B. C. of Aviation



A MODERN SEAPLANE.

TWO modern types of aircraft, a seaplane and tractor biplane, with the names of the various parts marked. The names are taken from the nomenclature for aeronautics as adopted by the National Advisory Committee for Aeronautics. Those terms appearing in parentheses are the names which were applied formerly to these parts. For example, the stabilizer now is spoken of as the tail fins and the word fuselage has been replaced by the term body



AT the right is shown the arrangement of the forward part of body, giving the location of the engine, radiator, driver's and passenger's seats. Usually the driver's seat is placed back of the passenger's, but in airplanes designed for war purposes the reverse is generally true. This is done so that the pilot is free to use his own gun mounted in front of him. It also allows the occupant of the rear seat to manipulate one or more guns mounted over the pilot's head or on the body back of rear seat

Paint Your Own Car

Step-by-Step Process Outlined by Which You Can Apply a First-Class Finish

In Two Parts—Part I

By J. M. Coles

The average car owner looks upon the repainting of his machine as a task that can be accomplished only by experts, that is, if the appearance of the car is to be first class. This idea is erroneous and in this two-part article every step in painting and refinishing every part of the car, not only the body, but the chassis, wheels, lamps and fixtures, is explained in detail, the equipment outlined and the material for every phase of the work made clear. With the proper materials, the rest only requires patience and care in the application of the various colors and the proper mixtures of the varnish and finish. This two-part article is very complete and the reader will find all the information contained herein that is necessary to a first-class job of painting.—Editor.

IN these days of quantity production the favorite method of painting used by the motor car manufacturer is the modern oven system wherein the paint is baked on the metal body in successive coats. Rapid procedure is a necessity in factory paint shops because the insistent demands of the production schedule make it impossible for the bodies and other parts to be standing around the shop drying between coats in the old-fashioned way.

Oven methods, however, though suitable for factory use, and, perhaps for the professional car painter who can afford the necessary equipment, are out of the question for the car owner who wishes to get the best possible results at minimum expense.

Before taking up the matter of retouching or repainting, however, it must be pointed out that car owners frequently are put to considerable expense in having their cars repainted entirely or practically so, when a little care will render such extreme measures unnecessary. The timely application of a new coat or two of paint, well protected with varnish, will restore a worn and battered finish to its pristine smartness. Particular care should be exercised to see that the varnish is thoroughly applied so that it will present a strong resistance to the erosive effects of wear and weather even when the finish is not subjected to the severe trials of continued cleaning and polishing with preparations which detrimentally affect the surface. It should be realized that the varnish is the real protection for the paint, and once this is destroyed or its protective qualities impaired, deterioration and eventual destruction of the pigment is only a matter of time.

Expert painters state that the finish of a car should not be allowed to go for more than six months without at least varnishing as, if the paint is bared, even in small spots, it quickly becomes patchy and such places must be retouched with paint to match, which is usually rather a difficult task and one that calls for a marked measure of skill with the brush.

It is especially essential to see that the color coats are well protected before allowing the car to undergo the severe conditions existing in variable weather. When the surface seems brittle and shows small cracks under the varnish it should be treated with water and pulverized pumice and well rubbed on, which cleans the surface of grease and dirt. After this step has been completed the entire surface should be washed with cold water and any badly worn spots should be carefully gone over with a paint which matches the body color. In this operation it is customary to put sufficient varnish in the retouching paint to make it hold its color.

In applying the retouching color it is important not to spread this on the surface any more than is absolutely necessary to cover the spot, only a small amount of the paint being applied. If the retouching is done carelessly so that the paint forms blotches this will spoil the job as the spots will show up badly through the varnish.

After allowing the surface to dry thoroughly the first varnish coat is applied and after washing with cold water when it is perfectly dry the surface coat of finishing varnish is put on. It always pays to spend a little more for good paint, varnish, etc., than to skimp on these requisites to rejuvenating the car's appearance. Good materials last longer than cheap ones and preserve the quality of the car's appearance to a much greater degree. If the surface is not keep well protected with paint and varnish, rust will soon make its appearance and the body or other parts affected immediately become more or less impaired.

Sometimes the entire body of the coloring is in such bad condition that the only satisfactory process is to go over the entire car with a coat of paint, allowing this to dry, then putting on any striping that may be desired and finally revarnishing.

If, however, the entire car is not repainted, the radiator should not be forgotten, but given a coat of heat-resisting paint, being careful not to make this coat a thick one and not to let the paint run and clog up any of the passages or spaces between the fins. Of course the fenders should be treated the same as the rest of the car and given a strong, smooth coat of finishing varnish.

First Step

IF the varnish coat is not impaired to a serious extent a series of primary coatings is by no means necessary. The body of the car should be thoroughly cleaned, the grease spots being scoured off carefully and the surface sandpapered. Dents and breaks should be touched up with good paint and, after drying, filled with a hard-drying putty. This should be given ample opportunity to dry, at least 24 hr. being allowed to lapse before proceeding further with the operation.

Second Step

The next step is to scour these putty spots so that they are level with the field surface. For this purpose a block of rubbing brick dipped in gasoline should be used. The body is now ready for the application of the paint, although it must be well cleaned before this is undertaken as particles of dust, dirt, etc., will make rough spots in the paint and also prevent it from adhering properly to the body.

Third Step

It is preferable to lay the paint on thinly in several coats as required by the condition of the body rather than to attempt making one thick, heavy coat do the work because in the latter case it is very difficult and sometimes impossible to secure a neat, smooth and workmanlike job. A coat of varnish color should be laid over the preceding coats, and after this has been allowed to dry properly it is an excellent idea to go over it with a soft rubbing block, lightly coated with pumice powder or some similar abrasive.

Fourth Step

When this step has been satisfactorily completed, any striping desired should be done. The main idea in striping bodies, fenders, etc., as in the case of other conveyances, is to relieve the large bodies of color by a touch of a contrasting tone. One or more coats of rubbing-varnish should be applied over the striping, depending on the quality of surface desired. These should be well rubbed down with water and powdered pumice and given ample time to dry before the completion of the job with a coat or two of finishing varnish.

Fifth Step

In preparing the chassis for retouching or repainting every part must be thoroughly cleaned by scouring and washing with soap, turpentine and sometimes sal soda. Unless this cleaning process is thoroughly carried out. the painting operation will almost assuredly prove unsatisfactory. After every part has been rendered absolutely clean, the entire surface should be gone over with sandpaper and the resulting dust rubbed off. Surface fractures are next touched up with paint and afterward filled flush with putty. A color coat is then applied and over that a coat of varnish color upon which is laid the striping, and this, in turn, is covered with one coat of heavy varnish.

Sixth Step

Fenders, lamps, windshield brackets, radiator, etc., all should be similarly treated. The materials for quickly resurfacing metal bodies, fenders, etc., may be obtained in a number of different forms in practically any good paint store. These consist of primers, fillers, surfacers, sealers, color varnish, etc., and their use enables the car owner to secure an attractive and durable finish in approximately one to two weeks, depending upon the number of coats applied. The priming coat and the lead coat which follows should be allowed an ample period to dry as they form the foundation of the entire paint structure.

An excellent, quick-drying primer frequently used by expert painters consists of two-thirds raw linseed oil and one-third turpentine and about twenty drops of coach japan to each pint of liquid. This will be found to dry in less than two days.

Seventh Step

Before a new coat of paint can be applied the old paint must be removed. This is by no means an easy operation and there are several methods of carrying it out. The old paint may be scraped or burned off or subjected to the chemical action of a specially prepared paint remover. If the scraping process is adopted, the utmost care must be taken to prevent the instrument from slipping or digging deeply into the surface and thus spoiling the smoothness of its contour. If the burning method is followed a considerable degree of expertness is required on the part of the operator as the instrument commonly used for this purpose is a gasoline blow torch, and, if the body is of wood, injudicious handling of the burner frequently results in the partial or total destruction of the body and even a metal body will be deformed unless expertly treated.

Eighth Step

This work of burning or scraping off the paint does not complete the task, for the surface must be carefully cleaned and rendered smooth by the use of sandpaper, emery cloth, etc., before the new paint can be applied. If a paint-remover is used the chemical composing it must be able to dissolve the binder which holds the old paint to the surface, this binder consisting in practically all cases of some kind of oil. Dissolving this oil robs the color of its base so that it is ready to be removed readily and quickly by suitable mechanical means. One of the chemicals having the power of dissolving the oils used in binders and therefore taking the paint off its base is acetone. The principle of loosening the paint from the surface to which it was formerly applied is the same as that of loosening the carbon deposit from the walls in cylinders.

The Chassis

IN treating the chassis, and also steel and aluminum bodies, it must be remembered that steel's capacity for the absorption of paint is small when compared with that of wood. If the same amount of linseed oil used as a primer for a wood body is applied to a steel surface or an aluminum one, the paint, although tough on the outside, is soft underneath and oozes out if the skin is broken. Thus a smaller amount of linseed oil should be used for priming an aluminum or steel body than for a wooden one, the remainder of the mixture consisting of turpentine and perhaps finishing varnish. The reason that the metal surface offers no foothold for raw linseed oil is that there are no pores for the oil to penetrate.

The fewer coats applied to a steel surface while at the same time insuring adequate protection, the greater will be their durability. Care should be taken in priming the surface to see that moisture is guarded against, as, if this once makes its way to the steel surface, rust sets in and undoes all the painter's handiwork. Another point on which it is well to use caution is to see that the finishing varnish, which is an excellent rust-preventative when properly applied, is not laid on too lavishly as the result will be a glossy surface which will render the application of the color coats difficult and insecure.

In preparing the metal for the reception of the primary coat, it should be sand-blasted, ground or emeried by hand unless it is feasible to pickle the metal by the use of hydrochloric or sulphuric acid. If sulphuric acid is used the metal must be thoroughly washed with hot water immediately afterward as the acid works its way into the molecular structure of the metal where it attracts moisture, resulting later in rust and corrosion. Hydrochloric acid is not nearly so great an absorbent of moisture as sulphuric but its action tends to be similar so that it is essential that all traces of it should be removed by washing.

The best preventative of undesired activity on the part of either acid consists in the use of limewater or some other alkali solution to neutralize their action. Of course, it is essential in any case that the body or other surface to be painted be absolutely dry and clean before a brush is applied to it.

To take up an average case as a concrete example let us suppose a car owner wishes to repaint an aluminum body blue with the running gear finished in gray. Of course, any other colors could be used, meaning simply the selection of different pigments, but the order of procedure, which would be the same in any case, may be outlined as follows:

First roughen the surface of the body with emery cloth or coarse sandpaper. Then apply either a coat of metal primer bought ready for use, or a coat of brown oxide of iron pigment thinned to a smooth brushing consistency with three parts of raw linseed oil and five parts pure turpentine, using a tablespoonful of japan to each quart of the mixture. If the coat is to be applied over an old paint foundation, reduce the quantity of oil to two parts oil to six parts turpentine. Permit this priming coat to dry for three days.

For a medium-cost job beat three parts dry white lead and one part keg, oil-ground lead to a glazing consistency in equal parts of rubbing varnish and coach japan, and, with a broad, half-elastic scraping knife, glaze the entire outside surface of the body, applying the pigment thin and evenly.

After forty-eight hours, go over this coat with No. 1 sandpaper, making the surface as smooth and fine as possible.

(To Be Concluded)

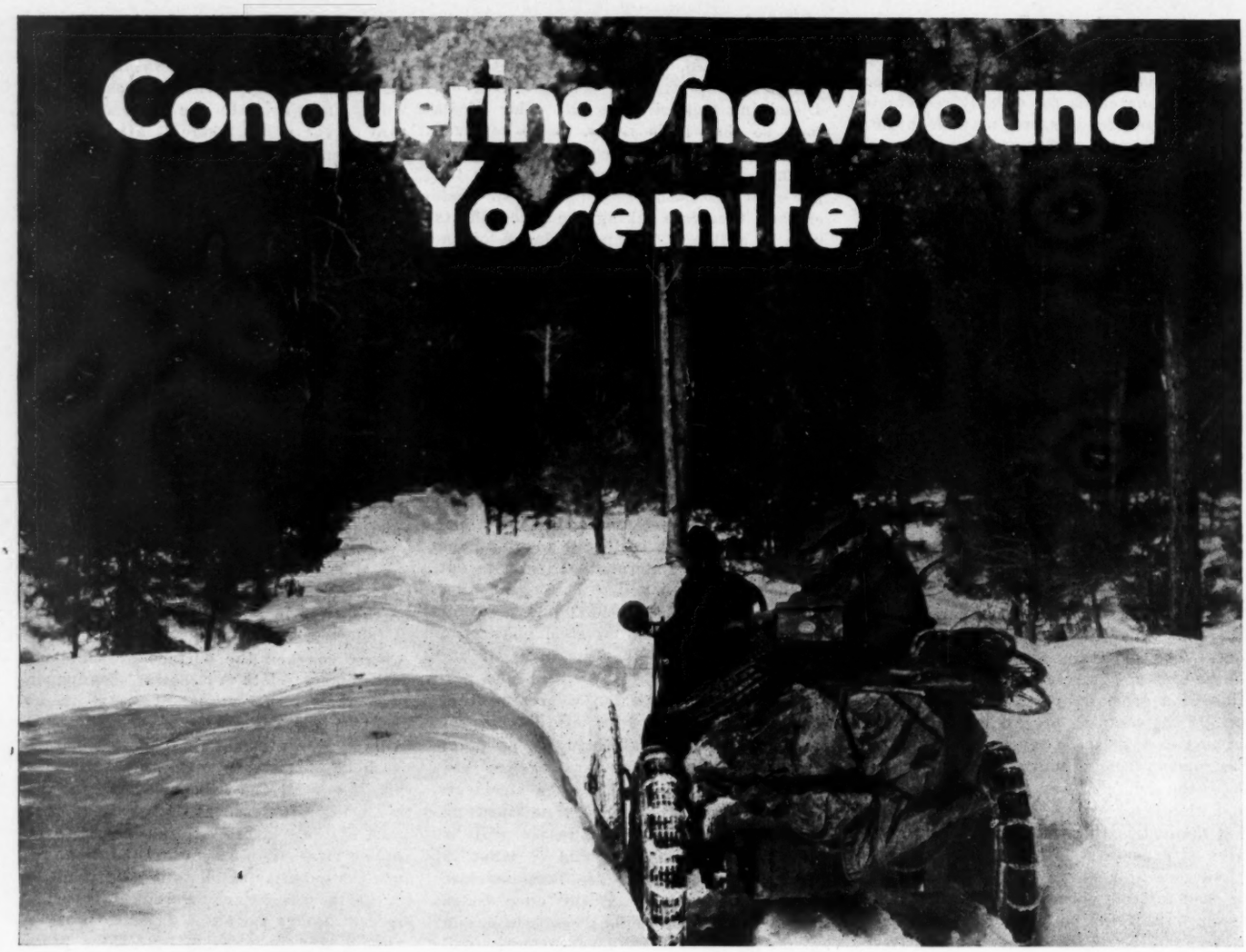
An Idyll in Motors

By Arthur S. Browne

'Twas long ago, while solitude supreme
Was reigning OVERLAND and sea, the MOON
In radiance WHITE o'er OAKLAND, field and stream
Could gaze each KNIGHT with wondering eye upon
REPUBLICS yet unborn. And ere the SAXON came,
The INDIAN on CHASE intent would strive
To PIERCE with HAWKEYE through the leafy frame
And bring the REO down in fluttering dive
Or stalk the gentle BUICK in the glade.
What hope to DODGE the DART this chieftain sent
'Gainst VELIE'S breast, where crimson flood unstayed
Spoke forth the VIM which to its flight was lent.
The PATHFINDER could read at any FORD
The MOGUL'S dainty tracks upon the beach;
The mosses touched by PACKARD coy and stored
For watchful eyes beyond the wavelets' reach.
More rare the CHALMERS, LOZIER than her kind,
And seeking rather for the CADILLAC springs,
Wherein the HUDSON doth her LOCO find,
Then through an EMPIRE starts her wanderings.

But how the scenes have changed! The OLDS have gone
With all their SIMPLEX ways, and SELDEN seen
Is chieftain's steed; for now on PULLMAN throne
Proceeds the KING, with PAIGE in WESTCOTT green
Attending on the ROYAL will, to note
What FIAT o'er the NATIONAL domain
For LIBERTY and justice to promote,
That no one need reBELL. Or yet again
To bid the PEERLESS PREMIER to address
And issue SCRIPPS, in CASE he fain would go
Abroad in AUTOCAR'tic fashion to impress
Alike the regal TOWER or cottage low,
On everyone he ME(e)TZ, his STERLING worth.
'Tis even GRANTed that, when so inclined,
He STUDEBAKER on his head in mirth,
To stimulate the workings of his mind;
And in a SUPERIOR way to make him see
That he or LITTLE GIANT anywhere,
Might HUPP and win some SIGNAL victory,
Under, or on the GLOBE, or in the air.

Conquering Snowbound Yosemite



This is how the floor of the valley looked when the going was the easiest

Refreshing on a Hot Day, Even Though It Did Happen Last March

FOR the fourth consecutive year a Studebaker was the first car to enter the Yosemite this year. Bucking snow for this honor is a task which none except those who really experience it can appreciate. Perhaps you have bucked snowdrifts for a few hours, or a few miles, but probably none of you who now are reading this would be tenacious enough to stick to this kind of an occupation for several days, let alone several weeks.

Do you know what it is to be in 20 ft. of snow, or even 2 ft. without a living soul within 20 mi. of you; not on foot, mind you, but in a motor car? That is one of the experiences which the several drivers of the Studebaker encountered during the trip from San Francisco into the valley of the Yosemite, a trip which began February 1 and was finished March 15 of this year.

Six in the party—five of them from the office of the Studebaker distributor at San Francisco and one from Modesto, Cal. —started the trip. They left the Golden Gate city at midnight February 1 and made Modesto at 4 o'clock the next morning. From there the trip to Coulterville was made under trying conditions, this stretch taking them until the morning of February 2. People in Coulterville were inclined to think the party lacking in good judgment when they said they were headed for the Yosemite. In rain the party left Coulterville and traveled over muddy and slippery roads to Bowers Cave, where the first snow was found. Plowing through 2 ft. of snow for seventeen miles the party reached McCauley's. Two of the party were called back to San Francisco on business, but the other four pushed on, this being the last place in touch with civilization until they reached the Yosemite. Three miles out of Coulterville the real fun began, for here was snow and plenty of it.

The car went over in the snow off the road two or three times with the snow getting deeper and more trying and the going slower. Imagine plowing and pushing through 7 ft. of snow at times, with a mile's progress one day, sometimes only a quarter of a mile, and for many days thereafter the same.

This is where the story gets short, the snow deeper and the time longer, for three weeks had already elapsed when they arrived at Merced Big Trees, with snow not only over the car, but higher than the heads of the party and piled 15 ft. in front of a ranger's cabin where they had taken refuge. Thus, they celebrated February 22. With the snow continuing dry and soft and with no foothold, it was impossible for them to move on. Spending their time in the cabin, their only egress and ingress being through a window, they found it impossible to move outside the cabin, and if it had not have been for the fuel left by the rangers during the summer, they would have been in greater difficulty, for this was absolutely essential for their cooking, eating and melting snow for drinking water.

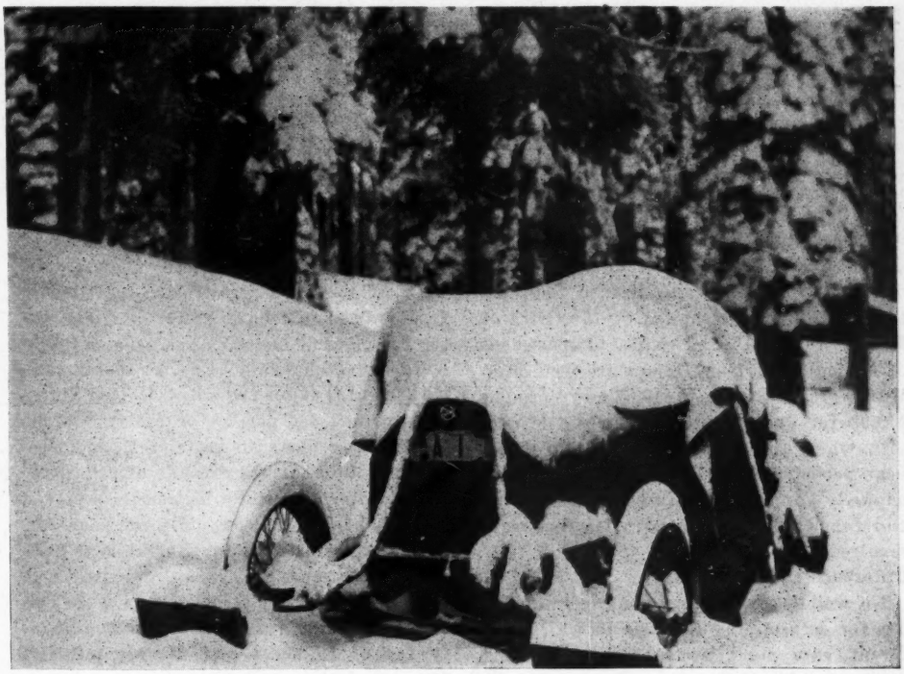
To make things more pleasant the party

found the food supply giving out, with the nearest place El Portal, twenty-two miles away. Pulling straws to see who would be elected, two of them started on their snow shoes for El Portal, taking four days to complete the trip. Through the aid of a horse secured at El Portal, this enabled them to save twelve miles of carrying their load on the return trip.

With 70 lbs. of rope, 100 lbs. of food and 5 gal. of gasoline distributed between them, they took two days to finish the last ten miles. To make it more pleasant, it started snowing again. When they arrived at the cabin they found it almost entirely covered by snow.

The next two days brought a change, however. After being there already eight days they began working to move the machine, which they succeeded in uncovering after 36 hrs. of labor, then on to El Portal. The hardships were so great and the progress so slow, they began to feel discouraged, and for a change left for El Portal, thinking they would have to give it up. Arriving there they telephoned the company—they did not think it could be done under the circumstances, but hearing that other contestants were reported only twenty miles behind, they again returned to the machine, walking back eighteen miles that day and finding it under 3 ft. of snow. Again they managed to move it another quarter of a mile by placing wooden runners under the axle, canvas on the wheels cleated with wood, instead of tires. This method took time, but, aided by a rope, they moved the car along.

Working 42 hrs. without sleep or rest, they arrived within all but a mile of the third view of Yosemite, on the Coulterville road.



The Studebaker partially snowed under over night

March 13, when they had been out nearly six weeks, found them within two miles of another man, named McCauley, the other side of the mountain, where they, to escape their wet sleeping bags which had frozen stiff, slept that night.

On the 14th, receiving renewed courage with the good food and sound sleep, they went back to the machine again, which was found under 7 ft. of snow. Working until seven that night, then to McCauley's for another night of rest and sleep, they returned on the 15th and after working until early morning, found themselves only one-quarter of a mile from El Portal, it taking them from 9 in the morning until 2 in the afternoon to make that last quarter.

From there on it was easy. With only twenty-four miles to go into the valley proper, they followed the road which had been broken by the stage into El Portal, and finished the trip.

Every known means were employed to get traction in the light dry snow

Registration Fees Vary Widely

States Lack Uniform Basis for Registering and License Charges—Other Differences Noted

IT cost motor vehicle owners in the United States in 1916 an average of $7.36 per car for registration and license fees, according to figures compiled by the Office of Public Roads, United States Department of Agriculture. New Hampshire secured in 1916 a gross revenue of $19.67 and Vermont $19.02 for every motor car, while Minnesota, where the registration is for a three-year period, received only about 50 cents annually for each car. In South Carolina and Texas no annual registration fees were required.

Difference in Rate Making

No well-developed and definite basis exists for determining the fees to which different cars shall be subject. In some States the fee is based on the net weight of the vehicle; in others the carrying capacity, the horsepower, or some combination of these factors is used. Requirements for registration or licensing of chauffeurs, owner operators, and dealers vary widely.

The amount of fees collected per car, whether pleasure or commercial, is as yet far from uniform, and is still further complicated by the widely varying requirements for the registration or licensing of chauffeurs, owner operators, dealers, etc. Thus, if the total registration and license fees be used as a basis of revenue, and the total number of motor cars, trucks and commercial vehicles as a basis for motor cars, it is found that for the entire United States the average fee per motor car was $7.36. On the same basis the state of Vermont secured in 1916 a gross revenue of $19.02 for every motor car, while Minnesota received only about 50 cents annually for each car, as the registration is for a three-year period. Furthermore, in Texas and South Carolina, no annual registration fees were collected, the only requirement being a county fee of 50 cents and $1, respectively. These variations are shown in a tabulation in the July 12 issue of MOTOR AGE.

Two Taxes

In most states motor cars are taxed as personal property in addition to the registration fees. In Idaho, Iowa, Michigan, New York, Oklahoma, Pennsylvania, and Vermont the registration fees are in lieu of all other taxes. Therefore, in making any comparison of the fees as between the several states, this fact should be borne in mind, especially in comparing the fees.

The registrations of motor cars, motor trucks, commercial vehicles, chauffeurs and operators, dealers and manufacturers, the total gross registration and license revenues, and the amount of this available for road work, either by or under the state highway department or by the local subdivisions, for the year 1916, was given in a previous issue. The number of registrations given at that time necessarily do not indicate the exact number of motor vehicles of any one or all of the several classes in actual use or existence in the several states, except so far as the laws of the several states require annual registration under these classifications, and as these laws are strictly enforced. Many states made no distinction, so far as the registration records are concerned, between pleasure and commercial cars. A few states register all motor vehicles, including motorcycles, under one single class, while some states do not require the registration of motorcycles.

On this and the following pages are given fees in force and the uses to which they are put.

Table III.—Motor Vehicle Registration and License Fees in Force January 1, 1917

STATE	MOTOR CYCLES	PASSENGER CARS	MOTOR TRUCKS AND COMMERCIAL CARS	CHAUFFEURS	OWNER OPERATORS	DEALERS AND MANUFACTURERS
Alabama	$3; with side-car attachment, $5.	Less than 25 hp., $7.50; 25 to 29 hp., $12.50; 30 to 39 hp., $17.50; 40 hp. and over, $20; electric cars, $12.50; steam cars, $15.	Same as passenger cars, except that those over 40 hp. pay $25 each.*	Original, $5; renewal, $2.50.	None	$25 to $125.
Arizona	$2	25 hp. and under, $5; 26 to 40 hp., $10; over 40 hp., $15.	Same as passenger cars.	Perpetual, $5.	do.	1 vehicle of each class at passenger-car rates.
Arkansas	None	All motor vehicles, $10.	do.	$1	do.	do.
California	$2	Electric cars, $5; all others, 40 cents per hp.	Equipped with pneumatic tires, same as passenger cars; others pay additional; less than 2 tons unloaded, $5; 2 to 3 tons, $10; 3 to 5 tons, $15; over 5 tons, $20.	Original, $2; renewal, $1.	No fee	5 cars, $25, and $2 for each additional; motor cycles, $5.
Colorado	$2	20 hp. and under, $2.50; 21 to 40 hp., $5; 41 hp. and over, $10.	Same as passenger cars.	$1	None	5 cars, $5.
Connecticut	$2	50 cents per hp.	½ ton or less, $11; 1 ton, $15, and increasing to $225 for 10 tons, and $50 per ton for each ton additional.	$2	$2	Motor cycles, $10; others, $50.†
Delaware	$3	All cars $5 each.	Same as passenger cars.	$5	$5; family, $8.	$5 for each class demonstrated on public roads.
D. of Columbia	$2	All cars $2 each.	do.	$2	$2	$2 for each car demonstrated on public roads.
Florida	$2	County, cars seating not more than 2 persons, $3; 3 to 5 persons, $5; 6 to 10 percons, $10; 11 to 20 persons, $15; 21 or more persons, $25.	Trucks, 1,000 lb. or less, $10; 1,000 to 2,000 lb., $20; 2,000 to 3,000 lb., $30; 3,000 to 5,000 lb., $40; over 5,000 lb., $50.‡	$2	None	None.
Georgia	$2	Not exceeding 25 hp., $3; 26 to 40 hp., $4; over 40 hp., $5; electric cars, $4.	Not exceeding 1 ton weight. $3; not exceeding 3 tons, $4; not exceeding 5 tons, $5; exceeding 5 tons, $6.	$2	do.	$10 for 2 number plates and $1 for each duplicate.
Idaho	$5	30 hp. or less, $15; 31 to 40 hp., $20; 41 to 50 hp., $25; over 50 hp., $40.	Same as passenger cars.	$2	do.	$35 for each make.
Illinois	$2	Electric cars, $5; others, 25 hp. or less, $4; 26 to 35 hp., $6; 36 to 50 hp., $8; over 50 hp., $10.	May be registered locally. Fees not to exceed $10 for 35 hp. or less, and $20 when over 35 hp.	Original, $5; renewal, $3.	do.	$15 for 2 plates and $1 each for duplicates.
Indiana	$2	Electric cars, $3; others, 25 hp. or less, $5; 26 to 40 hp, $8; 41 to 50 hp., $15; over 50 hp., $20.	All commercial cars, $5.	$2	do	$25; duplicate plates, $1 each.

STATE	MOTOR CYCLES	PASSENGER CARS	MOTOR TRUCKS AND COMMERCIAL CARS	CHAUFFEURS	OWNER OPERATORS	DEALERS AND MANUFACTURERS
Iowa	$3	20 hp. or less, $8; over 20 hp., 40 cents per hp.; all electric and steam cars, $15 each.	Same as passenger cars.	None	do	$15.
Kansas	$2	All cars $5 each.	do.	do	do	1 car of each class at passenger-car rates.
Kentucky	$5	Less than 25 hp., $6; 25 to 50 hp., $11; 50 hp. and over, $20.	do.	Original, $2; renewal, $1.	do	1 registration for each class of regular rates.
Louisiana	$2	25 cents per hp., with a minimum fee of $5 per car.	All motor trucks, $7.50 each.	None	do	1 regular registration for each make; second-hand dealers, $10.
Maine	$3	20 hp. or less, $5; 21 to 35 hp., $10; over 35 hp., $15.	Automobiles used for hire, same as passenger cars; motor trucks, $10.	$2	$2	$25.
Maryland	$3	50 cents per hp.; minimum charge, $5; $1 per hp. if operated for hire.	Trucks with solid tires and rated capacity of not more than 1 ton, $8; for each additional ton capacity, $6; trailers, $5 each.	$3	$2	$20 for 2 sets of tags and $10 for each additional set. For dealers in motorcycles, 4 tags, $8; additional tags, $2 each.
Massachusetts ..	$2	Under 20 hp., $5; 20 to 29 hp., $10; 30 to 39 hp., $15; 40 to 49 hp., $20; 50 hp. and over, $25.	Trucks under 1 ton, $5; and $3 for each additional ton.	Original, $2; renewal, 50 cents; examination, $2.	Original, $2; renewal 50 cents.	$10, motorcycles; $25, motor vehicles, and $5 additional for each car over 5 operated on public roads.
Michigan	(§)	Electric cars, $1 for each motor hp. plus 25 cents for each 100 lbs of weight; others, 25 cents per hp. plus 25 cents for each 100 lbs of weight.	Electrics, 50 cents per motor hp. plus 25 cents for each 100 lbs of weight; others, 15 cents per hp. plus 15 cents per 100 lbs of weight.	$2	None	$50 for 5 cars and $10 for each additional car. ‖
Minnesota	$1.50	All cars $1.50.	Same as passenger cars.	Original, $1.50; renewal, $1.	do	$10.
Mississippi ....State, $2; county, $2.40.		State, $2; county, electric cars, $4.80; others, 36 cents per hp.	4,400 lbs capacity or less, $8.40; over 4,400 lbs, $16.80.	None	do	Regular rates for 4 sets of plates.
Missouri	(§)	Less than 12 hp., $2; 12 to 23 hp., $3; 24 to 35 hp., $5; 36 to 47 hp., $7; 48 to 59 hp., $8; 60 to 71 hp., $10; 72 hp. and over, $12.	Same as passenger cars.	$1.50	do	$10; for each duplicate, $5.
Montana	$2	All cars $2 each.	Same as passenger cars.	$2	None	$10 for each type.
Nebraska	$2	All cars $3 each.	All $5 each.	None	do	1 regular registration for each class, $5.
Nevada	$3	20 hp. or less, $3; 21 to 40 hp., $5.50; over 40 hp., $8.	Same as passenger cars.	do	do	$10 for 4 number plates; $1 for each duplicate.
New Hampshire.	$2	15 hp. or less, $10; 16 to 30 hp., $15; 31 to 40 hp., $20; 41 to 50 hp., $25; 51 to 60 hp., $30; over 60 hp., $40.	do.	Original, $5; renewal, $1.	Original, $3; renewal, $1.	$25 for 6 plates; motorcycles, $5 for 3 plates.
New Jersey.....	$2	10 hp. or less, $4.50; 11 to 29 hp., $7.50; 30 hp. or over, $15.	Unloaded weight 2 tons or less, same as passenger cars; above 2 tons, $10 in addition to hp. rating; trailers, $3.	$3	$3	$5 per car not to exceed 5.
New Mexico....	$2	Less than 12 hp., $2; 12 to 19 hp., $4; 20 to 29 hp., $6; 30 to 39 hp., $8; 40 to 49 hp., $10; 50 hp. or over, $12.	Same as passenger cars.	None	None	$12.
New York.....	$2.50	25 hp. or less, $5; 26 to 34 hp., $10; 35 to 49 hp., $15; 50 hp. and more, $25.	$5 each.	Original, $3; renewal, $2; examination, $2.	do	$15, plus $1 for each duplicate tag.
North Carolina..	$2	25 hp. or less, $5; 26 to 40 hp., $7.50; over 40 hp., $10.	Same as passenger cars.	None	do	$10, plus $1 for each duplicate plate.
North Dakota...	$3	All cars $3 each.	do.	do	do	None.
Ohio	$2	Electric cars, $3; all others, $5.	do.	$3	do	$10 each make of motorcycle and $20 each make of automobile.
Oklahoma	(*)	50 cents per hp. first year; second, 40 cents per hp.; third, 30 cents per hp.; and thereafter, 20 cents per hp.	do.	None	do	$15 for 2 tags and $1 each for additional tags.
Oregon	$3	Electric cars, $3; others, 26 hp. and less, $3; 27 to 36 hp., $5; 37 to 40 hp., $7.50; above 40 hp., $10.	Electric trucks, $5; others same as passenger cars.	$2	do	$10 for 2 tags and $2 for duplicate sets.
Pennsylvania ..	$3	Less than 20 hp., $5; 20 to 34 hp., $10; 35 to 49 hp., $15; 50 hp. and above, $20.	With pneumatic tires, same as passenger cars; others, including load, less than 2 tons, $5; 2 to 2½ tons, $10; 2½ to 5 tons, $15; 5 to 7½ tons, $20; 7½ to 12 tons, $25; trailers, including load, less than 5 tons, $3; 5 to 12 tons, $5.	$2	No fee	$10.
Rhode Island ..	$2	15 hp. or less, $5; 16 to 30 hp., $10; 31 to 40 hp., $15; over 40 hp., $25.	Carrying capacity 1 ton or less, $7, with $3 additional for each ton to 4 tons, and then $4 for each ton above 4 tons; over 9-ton capacity, $40 each; trailers, $10 to $30 each.	$1	$1	$25 for 5 vehicles and $5 for each additional vehicle.
South Carolina..	$1	All cars $1 each.	Same as passenger cars.	None	None	None.
South Dakota...	$2	All cars $3 each.	No registration required.	do	do	$5.
Tennessee .....$1 and $2.50		Cars 4-passenger or less, $5; cars more than 4-passenger, $7.50; county registration, $1 for any motor vehicle.	All motor trucks $5.	do	do	$10.
Texas	50 cents	All cars 50 cents each.	Same as passenger cars.	do	do	None.
Utah	$3	Electric cars, $10; others, 25 hp. and less, $5; 26 to 40 hp., $10; above 40 hp., $15.	$10.	$2	do	$25, and $2 for each set of duplicate plates.
Vermont	(*)	First registration, $1 per hp.; second, 75 cents per hp.; third registration and thereafter, 50 cents per hp.	Same as passenger cars.	$2	$2	$50.

STATE	MOTOR CYCLES	PASSENGER CARS	MOTOR TRUCKS AND COMMERCIAL CARS	CHAUFFEURS	OWNER OPERATORS	DEALERS AND MANUFACTURERS
Virginia	(*)	40 cents per hp.	Same as passenger cars.	$2.50	None	$50.
Washington	$2.50	25 hp. and less, $3; 26 to 39 hp., $5; 40 hp. and over, $7.50.	Automobiles and busses for hire, 50 cents per hp.; motor trucks under 2 tons capacity, $10, plus $5 for each additional ton up to 5 tons; motor trucks for hire, double above rates.	None	do	$5; for motorcycles, $3.
West Virginia..	None	All cars $10 each.	Same as passenger cars.	$2	do	None.
Wisconsin	$2	All cars $5 each.	do.	None	do	$10.
Wyoming	None	do.	Registration not required.	do	do	None.

* Same rate as passeuger cars.
* Cars used for transportation of passengers paying fare, 5 or less passenger capacity, $25; 6 to 9 passenger capacity, $40; 10 or more passenger capacity, $60; operating between towns or cities 10 miles or more apart, a flat fee of $40.
† In case of manufacturers, $25, plus $1 for each car tested on public roads.
‡ When used for hire, 2 or less passenger capacity, $10; 3 to 5 passenger capacity, $20; 6 to 10 passenger capacity, $30; 11 to 20 passenger capacity, $40; 21 or more passenger capacity, $60; trucks, 1,000 pounds or less capacity, $15; 1,000 to 2,000 pounds capacity, $30; 2,000 to 3,000 pounds capacity, $40; 3,000 to 5,000 pounds capacity, $50; over 5,000 pounds, $60.
§ Same rate as passenger cars.
‖ In case of manufacturers, motorcycles $20, including 10 number p lates.

TABLE IV.—Administrative Provisions in Force January 1, 1917, Affecting Motor Vehicle Registrations, Licenses and Revenues

	Registration and licenses					Revenues from registrations and licenses		
		Renewals					Proportion expended for roads under supervision of—	
STATE	Official or department in charge	Car registrations	Operators' and chauffeurs' licenses	Requirements for for operators' and chauffeurs' licenses	Non-residents' exemptions	Applied to—	State highway department.	Local road authorities.
Alabama	State board of equalization through probate judge.	Annual Oct. 1.	Chauffeur, annual, Oct. 1.	Chauffeur must be 18 years old.	Reciprocity.	State, county, and city general funds.	None.	None.
Arizona	Secretary of state.	Annual, Jan. 1.	Chauffeur, perpetual.	No examination.	6 months	State road tax fund.	All of net.	do
Arkansas	Commissioner of state lands, highways and improvements.	do	Chauffeur, annual from date.	Chauffeur must be 18 years old.	No limit.	State and county road fund.	One-half.	One-half.
California	Superintendent of motor vehicle department.	do	Chauffeur, annual.	No examination.	3 months.	State and county road work.	One-half net.	One-half net.
Colorado	Secretary of state.	do	Chauffeur, annual, Jan. 1.	do	90 days.	do	do	do
Connecticut	do	do	All operators, annual, Mar. 1.	do	No limit.	Maintenance state roads.	All of net.	None.
Delaware	do	do	All operators, Jan. 1.	Must be 16 years old; no examination.	Reciprocity.	General fund.	None.	do
District of Columbia	Automobile board.	Perennial	All operators, perpetual.	Examination.	do	do	do	do
Florida	Secretary of state and county tax collector.	Annual, Oct. 1.	Chauffeur, state, perpetual.	No examination.	15 days.	State and county road work.	15 per cent.	85 per cent.
Georgia	Secretary of state.	Annual, Mar. 1.	Chauffeur, annual, Mar. 1.	Must be 16 years old.	30 days.	Net to state road fund for apportionment to counties.	None.	All of net.
Idaho	State highway commission through county assessor.	Annual.	Chauffeur, annual.	Chauffeur must be 18 years of age.	Reciprocity.	State highway fund.	25 per cent.	75 per cent.
Illinois	Secretary of state.	Annual, Jan. 1.	Chauffeur, annual, Jan. 1.	Chauffeur, examination.	60 days.	State "road fund."	All.	None
Indiana	do	do	do	do	do	Net, county road work.	None.	All of net.
Iowa	do	do	None.	Must be 15 years of age.	Reciprocity.	90 per cent to counties for roads; 5 per cent to state highway department.	5 per cent of gross.	90 per cent of gross.
Kansas	do	Annual, July 1.	do	Must be 14 years of age.	30 days.	Net, maintenance county roads.	None.	All of net.
Kentucky	Commissioner of motor vehicles.	Annual, Jan. 1.	Chauffeur, annual, Jan. 1.	Chauffeur, examination.	Reciprocity.	Net to state road fund.	All of net.	None.
Louisiana	Secretary of state.	do	None.		do	90 per cent to parish road work; 10 per cent for expenses.	None.	90 per cent gross.
Maine	do	do	All operators, annual, Jan. 1.	Examination optional.	30 days.	State road work.	All.	None.
Maryland	Commissioner of motor vehicles.	do	Owner, perpetual chauffeur, annual.	do	Reciprocity; two periods of 7 days each.	Net 20 per cent Baltimore street work, 80 per cent state road maintenance.	80 per cent of net.	do
Massachusetts ..	State highway commissioner.	do	All operators, annual from date.	Chauffeur, examination.	Reciprocity.	Net 20 per cent small town roads; 80 per cent maintenance state roads.	All net.	do
Michigan	Secretary of state.	do	Chauffeur, annual, Jan. 1.	No examination.	90 days.	State and county road work.	One-half net.	One-half net.
Minnesota	do	Triennial.	do	Chauffeur, examination.	30 days.	Net, state road and bridge fund.	All net.	None.
Mississippi*	State auditor and county tax collector.	Perennial with State; annual Jan. 1 with county.	None.	.....	60 days.	State revenues to general fund; county to county road work.	None.	Net county revenue.

* After 3 years fee reduced to one-half.

STATE	Official or department in charge	Registration and licenses: Renewals: Car registration	Registration and licenses: Renewals: Operators' and chauffeurs' licenses	Registration and licenses: Requirements for operators' and chauffeur's licenses	Registration and licenses: Non-residents' exemptions	Revenues from registrations and licenses: Applied to—	Revenues from registrations and licenses: Proportion expended for roads under supervision of—: State highway department	Revenues from registrations and licenses: Proportion expended for roads under supervision of—: Local road authorities
Missouri	Secretary of state.	Annual, Feb. 1.	Chauffeur, annual, Feb. 1.	Must be 18 years of age; no examination.	20 days.	State "good roads fund."	All of net.	None.
Montana	do	Annual, Apr. 1.	Chauffeur, annual, Apr. 1.	No examination.	No limit.	State highway fund.	All net.	do
Nebraska	Secretary of state through county treasurer.	Annual, Jan. 1.	None.	Must be 16 years old.	30 days.	Net to county road work.	None.	All net.
Nevada	Secretary of state.	do	do		do	do	do	do
New Hampshire	Commissioner of motor vehicles.	do	All operators, annual Jan.	Examination, all operators.	10 days.	Road maintenance.	All net.	None.
New Jersey	do	do	do	do	Reciprocity; 15 days.	do	do	do
New Mexico	Secretary of state.	do	None.	Must be 14 years old.	60 days.	Net state and county road work.	50 per cent net.	50 per cent net.
New York	do	Annual, Feb. 1.	Chauffeur, annual, Feb. 1.	Chauffeur, examination.	Reciprocity.	State and local road work.*	50 per cent gross.	50 per cent gross.
North Carolina	do	Annual, July 1.	None.	Must be 16 years of age.	15 days.	80 per cent to county road work.	None.	80 per cent gross.
North Dakota	do	Annual, Jan. 1.	do	.....	No limit.	Net to county road work.	do	All net.
Ohio	do	do	Chauffeur, annual, Jan. 1.	Chauffeur, examination.	do	Net to state road fund.	All net.	None.
Oklahoma	Department of highways.	do	None.	.....	Reciprocity.	10 per cent appropriated for state highway department; 90 per cent county road work.	All.	.....
Oregon	Secretary of state.	do	Chauffeur, annual, Jan. 1.	Must be 18 years of age; no examination.	30 days.	Net to county road fund.	None.	All net.
Pennsylvania	State highway department.	do	do	Affidavits as to competency.	Reciprocity.	State and state-aid road work.	All gross.	None.
Rhode Island	State board of public roads.	do	All operators, annual from date.	Examination, all operators.	10 days.	Maintenance state roads.	All net.	do
South Carolina	Clerk of county court.	Perennial.	None.	.....	No exemptions.	General county fund.	None.	do
South Dakota	Secretary of state through county treasurer.	Annual, Jan. 1.	do	Must be 15 years old.	Reciprocity.	85 per cent county road work.	do	85 per cent.
Tennessee	Secretary of state and county clerk.	do	do	.....	No exemptions.	Net 10 per cent to state highway department; 90 per cent to county road work.	All net.	.....
Texas	County clerk.	Perennial	do	.....	do	General county fund.	None.	None.
Utah	Secretary of state.	Annual, Jan. 1.	Chauffeur, annual, Jan. 1.	No examination.	30 days.	Net to state road fund.	All net.	do
Vermont	do	do	All operators, annual from date.	Examination optional.	Reciprocity.	State maintenance fund.	do	do
Virginia	Secretary of commonwealth.	do	Chauffeur, annual, Jan. 1.	No examination.	2 periods of 7 days each.	Net maintenance state aid roads.	do	do
Washington	Secretary of state through county auditor.	Annual, Mar. 1.	None.	Must be 15 years of age.	90 days.	Net to permanent highway fund for maintenance.	None.	
West Virginia	State auditor.	Annual, July 1.	Chauffeur, perpetual.	No examination.	Reciprocity.	General fund.	do	None.
Wisconsin	Secretary of state.	Annual, Jan. 1.	None.	Must be 16 years of age.	No limit.	Net 25 per cent to state highway fund; 75 per cent county road work.	25 per cent net.	75 per cent net.
Wyoming	do	do	do	Must be 15 years of age.	do	Net county road work.	None.	All net.

* Does not apply to revenue collected within New York City, one-half of which goes to city general fund.

Price of Gas on National Old Trails

Los Angeles, Cal., Aug. 3—Transcontinental touring was never so popular as it is to-day. There is a rapidly-growing tendency to get away from the old-time fad of crossing from ocean to ocean by Pullman, this being the day of the "motor way." A short time ago the Automobile Club of Southern California, to prove this fact, stationed a counter at the bridge at Topock, Ariz., over which all motorists making the trip in either direction over the National Old Trails highway are compelled to pass. According to this counter there are at this time twenty-five transcontinental motor parties starting from western for eastern points every day, while during the same period of time more than forty parties of eastern motorists are starting for California.

This being true, it would seem natural to believe that there are hundreds of residents of the east who have decided upon or are contemplating a trip to western points over this particular trail during the coming weeks and months. To these motorists the club has a message, this being in the form of a list of the prices that are being charged for gasoline at the various points along the route, as follows:

City	Cost per Gal., Cents
Kansas City	20
McPherson	22
Lamar	27
La Junta	27
Trinidad	26
Albuquerque	30
Magdalene	35
Datil	45
Quaemadeo	50
St. Johns	40
Springerville	45
Holbrook	30
Flagstaff	35
Williams	35
Ashfork	30
Kingman	30
Topock	30
Needles	30
Barstow	25
San Bernardino	22

D. C. LICENSE GOOD ANYWHERE?

Washington, D. C., Aug. 3—Representative Adamson of Georgia, author of the bill to make a state or District of Columbia motor car license good in any state or district provided the person holding the license is qualified to drive his car is expected to come up for action soon in the House of Representatives. Judge Adamson expresses the belief that the bill will pass, despite objection to it in the past.

Urges Increased Gasoline Buying

Criticism of Curtailing of Pleasure Riding Says Production Needs Money

EDITOR MOTOR AGE—The difficulty in securing casing, the high cost of casing and labor, the difficulty of securing labor and the difficulty of transportation, together with the disposition on the part of the government to exempt nothing more in the proposed excess profit tax for the hazardous business of prospecting for oil than is exempted for the insurance, banking and other forms of less hazardous business, presents an extremely serious problem which may lead to an early oil famine. It is a subject that should be given deep and earnest consideration.

Drilling is being curtailed at an alarming rate. The government officials are so taxed with a multitude of duties and callers that it is impossible for them to grasp the seriousness of the situation and the dire results which may follow.

To expedite the huge problems which confront us our government is apt blindly to follow the example of the other countries that have been longer at war. Our conditions are vastly different. We have millions of acres of prospective oil territory. There is practically no limit to the oil we can produce, although the cost of oil may become prohibitive if a long period of inactivity should be brought about by a failure quickly to comprehend the true situation.

Other countries have been compelled to curtail the use of gasoline because their supply was limited and needed entirely for the government's use. The deficiency in ocean transportation is alone enough to

In this letter Henry L. Doherty takes issue with the statement made by A. C. Bedford, who would stop pleasure riding to win the war. Mr. Doherty, in a letter to MOTOR AGE, considers the danger that the threat to curtail the liberal use of gasoline at high prices will intimidate still further producers and curtail drilling

prevent these countries from securing an adequate supply of oil for normal uses. In our country the situation is different. It is purely a matter of cost.

Capital must always bear its own losses. One of the questions of the oil prospector now is, how much of his profits will be taken by the Government if his prospecting leads to a profit? This uncertainty as to legislation is a great handicap to all forms of business but not such a great threat to the public's welfare in other lines of business as in the oil business.

There is seldom enough oil above ground to supply the consumption for six months. Supplies are only maintained by constant fresh drilling and new prospecting. Every day of hesitation brings us closer to an oil famine.

I cannot concur in the theory that a restriction in the use of gasoline for motor cars, either by law or by creating adverse public opinion, will help solve our problem. In fact, I believe it will precipitate it. The threat of curtailing the liberal use of gasoline at high prices will still further intimidate oil producers and curtail drilling.

If the situation is handled with reasonable wisdom and despatch there need be no fear of an oil famine, and the danger of a gasoline famine would be still more remote.

There is no disposition on the part of the oil men to hold up the public as to price. Oil is not selling to-day as high as it would be selling if we had normal business conditions and no war. While it is proposed to guarantee the farmer $2 for wheat, with no excess profit tax, the oil men have maintained prices as close to the cost of production as though no war existed.

The oil business as a whole is not as profitable as the public have been taught to believe. The huge profits of the successful oil operators are constantly brought to the attention of the public, but nobody figures the amount of money that is sunk each year in unprofitable ventures. When rewards come, they come big; but losses are generally 100 per cent. It is the huge profits when a lucky strike is made that stimulates the search for new fields and the enormous loss which this often entails.

The ever present possibility of loss, which is now greatly accentuated by the existing markets for labor and materials, and the uncertainty of supplies, is one side of the picture. The certainty of a heavy excess profit tax and individual income tax is the other side of the picture.

The great army of men who produce our oil for us are in many cases of the rough and ready sort, but they are not penny-splitters and they are not holdup men. Few of them have diplomas to exhibit, and their English may not be of the best; but they know how to do things with their hands, feet and heads—and I do not believe there is a more loyal or a more likable bunch of men in the world.

They don't sulk and they don't whine; but they have to pay for their well-casing and their labor in the coin of the realm—and nobody is apt to back them or loan them money if they feel that losses must be borne alone but that profits must be commandeered by our government for war purposes.

The traditional order of things frequently leads us to continue to waste at the bung while we save at the spigot. For instance, every ton of coal we carbonize to make gas for town distribution produces in the gas about 2½ gal. of benzol and toluol. The bulk of all of this gas is used for fuel purposes. The benzol and toluol has no more value in the gas than an equal amount of cheap fuel oil or the commonest kind of a substitute gas. Commercial benzol and toluol sold for less than the price of gasoline prior to the European war. The government now pays from $1.80 to $2.05 a gallon for toluol for explosives.

Not one foot out of a thousand of the gas distributed for town use can be properly used and secure any advantage from the benzol and toluol content; and yet we continue to maintain the candlepower

Members of the New York Twenty-Second Engineers being served with soup from their new motor field kitchen

standards adopted before gas was used for fuel purposes or before the mantle lamp was invented, even though an abolition of the candlepower standard for gas would give us all the benzol and toluol needed for explosives at a price lower than the price paid for gasoline—and would also give us an enormous quantity of benzol and toluol as a substitute for gasoline as motor car fuel. It not only can be used in all of our existing motor cars, but it actually has a higher fuel value than gasoline. It would also be thoroughly practical to operate bus lines and taxicabs with compressed town gas.

The present situation can be met, and with ease; or, for lack of forethought, an oil famine can be precipitated with still greater ease.—Henry L. Doherty.

ENTER THE AUTO HORSE

St. Louis, Mo., Aug. 3—H. B. Krenning, who recently disposed of most of his interest in the Dorris Motor Car Co., announced this week the organization of the One-Wheel Truck Co., of which he is president. This company will manufacture a truck which will be marketed under the name of The Auto Horse and which best can be compared to a locomotive, in that it carries no part of its load but is attached to wagons of any type. It hauls up to 5 tons.

B. R. Parrott is announced as designing engineer. A peculiar mobile power is given to the truck by the fact that it is balanced on one wheel, 34 by 5, and can turn completely around without moving its load. The peculiar wheelbase is said to give it exceptional advantages in overcoming road difficulties and in mastering hills and turns in the roads.

MAINE REGULATES HEADLAMPS

Augusta, Me., Aug. 4—The Governor and council have passed a new lighting law which will go into effect Aug. 15. It aims to solve the headlight glare and limits the candlepower of bulbs to 24. The new law applies to motor vehicles and electric railway cars. The regulations allow the use of various devices, but lenses of colored glass are prohibited. Ground glass may be used. Spotlights are on trial, and if they are misused this summer they will be abolished altogether later, the law states. It was to have gone into effect Aug. 1, but the officials decided to allow the motorists some leeway, particularly those from other states. The regulations were formed by the Governor, his council and motor representatives.

FISHER ERECTS AIRPLANE PLANT

Detroit, Aug. 3—The Fisher Body Corp. is erecting in West Detroit a plant which will cover 10 acres, intended particularly for airplane body manufacture. The planes will be made here and the engines supplied by the government from other plants. It is intended to make, assemble and fly the airplanes in the Fisher organization and to turn them back to the government complete. The initial Fisher order is for 500 planes, totaling $5,000,000, which is in the nature of a trial, and after this order has been completed to the satisfaction of the government there is no limit set as yet on what will eventually be turned out.

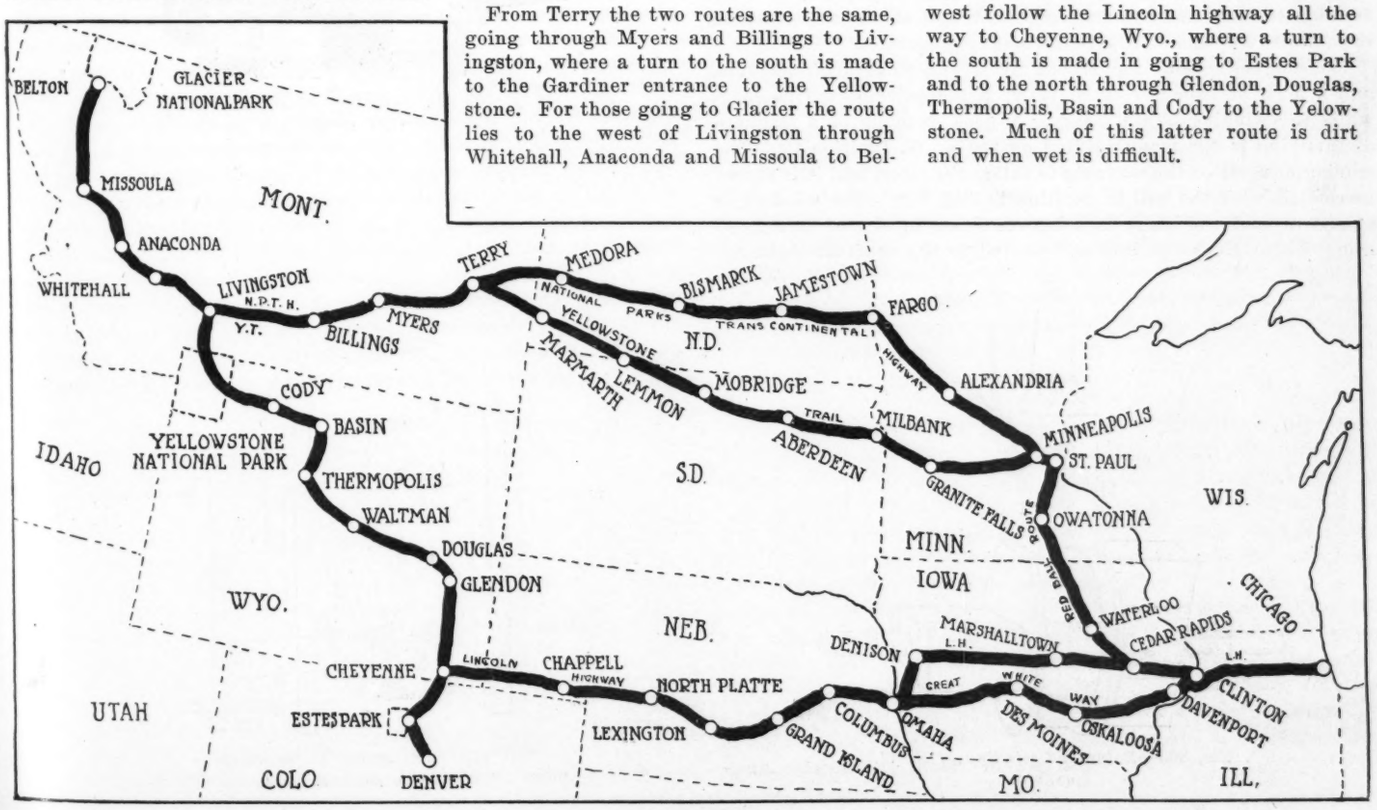
This 10-acre plant will be erected in sections by the Fisher Body Co. itself, and each section will be of standard size and of standard construction, so that the plant can be added to at any time while the airplanes are under construction in the units already set up.

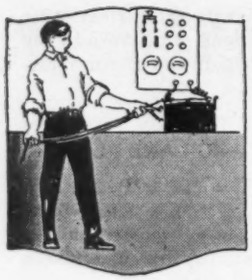
Chicago to Yellowstone, Glacier and Estes Parks

FOR those who contemplate driving to the National Parks this month or next, there are several routes that may be used, any one of which may be said to be as good as another. With Chicago as a starting point, go west to Clinton and if either of the northern routes are to be taken continue west over the Lincoln highway as far as Cedar Rapids, then bear north and west through Waterloo and Owatonna to the Twin Cities. It does not make much, if any, difference whether the Yellowstone trail or the National Parks Transcontinental highway is followed out of Minneapolis to the point where they join at Terry, Mont. The National Parks route goes through Alexandria, Fargo, N. D., Jamestown, Bismarck and Medora to Terry, and the Yellowstone trail through Granite Falls, Milbank, S. D., Aberdeen, Mobridge, Lemmon and Marmarth to Terry.

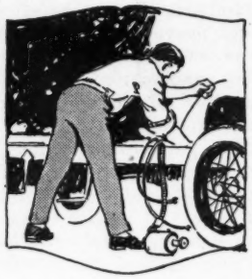
From Terry the two routes are the same, going through Myers and Billings to Livingston, where a turn to the south is made to the Gardiner entrance to the Yellowstone. For those going to Glacier the route lies to the west of Livingston through Whitehall, Anaconda and Missoula to Belton. West of the Mississippi the percentage of mileage on either of these routes that is other than dirt is very small. In dry weather either of the routes are as good as dirt road ever is.

From Clinton, Ill., one can follow the Lincoln highway through Cedar Rapids, Marshalltown and Denison to Omaha, although the White Way through Davenport, Oskaloosa and Des Moines is better than the Lincoln across Iowa. From Omaha west follow the Lincoln highway all the way to Cheyenne, Wyo., where a turn to the south is made in going to Estes Park and to the north through Glendon, Douglas, Thermopolis, Basin and Cody to the Yelowstone. Much of this latter route is dirt and when wet is difficult.





Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the fifty-fifth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered.

Part LV—Ignition Continued

THE operation of the magneto as explained in the previous section depended upon the rotation of a coil of wire in a magnetic field, which resulted in the various turns of the coil cutting the magnetic lines of force forming the magnetic field, and this cutting of the magnetic lines resulted in an electrical pressure being produced in the coil. The same results could be obtained by allowing the coil to remain stationary and by some means increasing and decreasing, and perhaps building up, the magnetic field through the coil in the opposite direction. In this second case there would be a relative movement of the turns of the wire forming the coil and the magnetic field, and this is the principle upon which the inductor type of magneto operates.

The magnetic field is produced by strong permanent magnets, and a mass of iron is rotated between the poles of the magnets while the winding is stationary. A good example of a magneto of this kind is one manufactured by the K. W. Ignition Co. The moving element of the magneto is called the rotor, and it is shown assembled with the coil in position in Fig. 303. The winding is placed around the shaft and between two blocks of laminated iron. These blocks of iron are riveted to the shaft at right an-

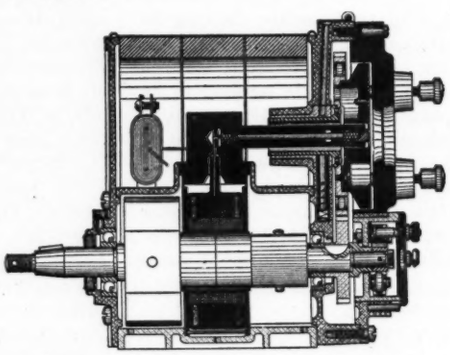


Fig. 304—Cross-section of K. W. inductor type magneto

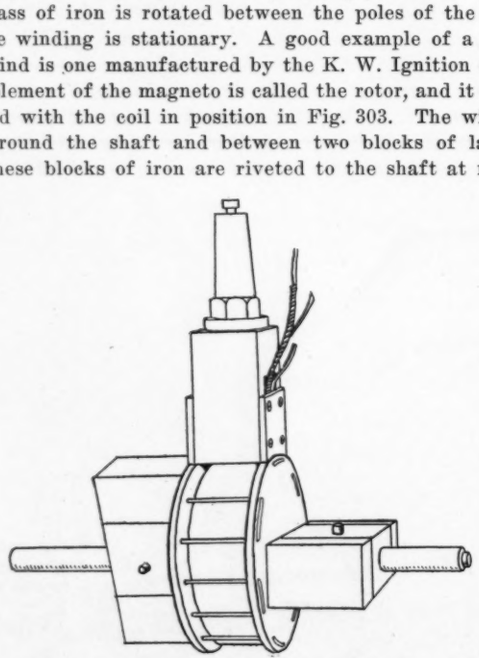


Fig. 303—Rotor and winding of K. W. magneto

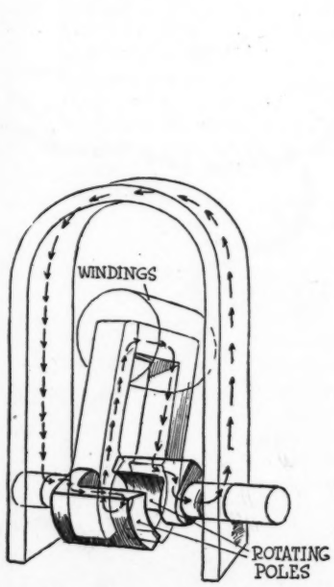


Fig. 305—Path of magnetic flux in Dixie magneto

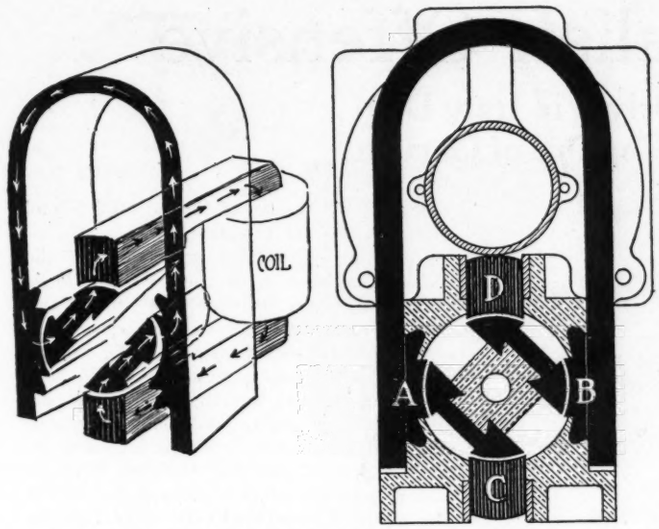


Fig. 306—Berkshire magneto, which works on somewhat the same principle as the Dixie

gles to each other. The polepieces attached to the end of this permanent magneto are so shaped and placed in such a position that the magnetic lines in traveling across from one polepiece to the other find a path of low magnetic resistance, or reluctance, through the winding and one end of each of the masses of iron attached to the shaft. The value of the magnetic flux, or the number of lines of magnetic force through the coil, will change as the reluctance of the path in which the magnetic lines travel changes, the flux increasing with a decrease in reluctance and decreasing with an increase in reluctance. Each quarter turn of the rotor, or each 90 deg., the direction of the magnetic flux through the coil will be reversed; consequently, an electrical wave of pressure equivalent to one-half cycle will be produced for each quarter turn of the rotor. A cross-section through a K. W. high tension inductor type magneto is shown in Fig. 304.

Dixie Magneto

The operation of the Dixie magneto in some respects is somewhat similar to the inductor type, but in this case the polepieces themselves revolve, and they do not reverse their polarity as in the case of the inductor type. The principle of the Dixie magneto may be understood easily by an inspection of Fig. 305. The polepieces, as shown in the figure, are one-sided and mechanically connected by a non-magnetic section. Each polepiece will have the same polarity as the end of the permanent magnet immediately behind it. This arrangement results in two pieces of iron with opposite magnetic polarity revolving in a circle. A piece of iron in the shape of a letter V has its ends shaped to form an opening in which the polepieces may revolve. A winding is placed about the bottom of this V-shaped piece of iron. Now, as the polepieces are caused to revolve, the magnetic poles pass the ends of the V-shaped piece, which causes the magnetic flux produced by these polepieces to reverse in direction through the winding.

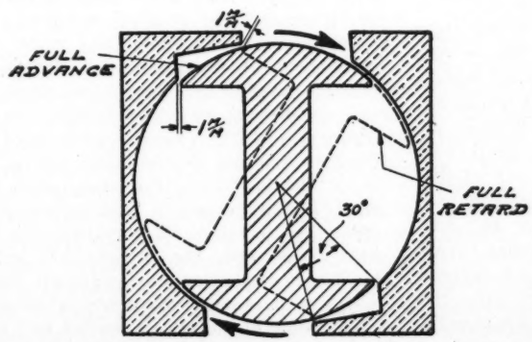


Fig. 307—Shape of pole pieces for Simms magneto

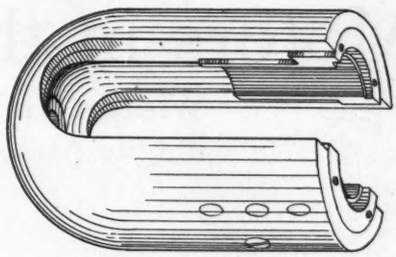


Fig. 308—Bell-shaped magnet for Mea magneto

Fig. 309—Relative position of armature and magnets for different positions of spark in Mea magneto

This magneto is unique in that the magnets are placed the reverse way of the usual custom, at right angles instead of parallel to the rotative axis.

Berkshire Magneto

The Berkshire magneto is a machine working on somewhat the same principle. Two cuts of this magneto are shown in Fig. 306. Referring to the figure, the two main poles of the magnets are A and B, while C and D are iron laminations running parallel to the armature as shown in the left-hand figure. The rotating armature is formed partly of iron and partly of aluminum. The iron parts are shown in black, and for the position of the armature shown in the figure the magnetic lines flow along the following path: From A to C through a portion of the armature, from C to D through the piece of laminated iron upon which the coil is wound, from D to B through another section of the armature and from B to A through the magneto. As the armature revolves and the iron parts come opposite the poles, instead of bridging the gap between them as sketched, there is no complete magnetic circuit through the core of the coil. This means that revolving the armature continually makes and breaks the magnetic circuit through the core of the coil.

Simms Magneto

A special feature of the magneto made by the Simms Magneto Co. is the design of the polepieces, which have extensions on the edges following the direction of rotation of the armature. These extended edges keep the edges of the armature shuttle within the influence of the polepieces for all positions from full retard to full advance. This results in the shuttle never being widely separated from the polepieces when the current is broken. The shape of these polepieces is shown in Fig. 307.

Mea Magneto

The magnets in the Mea magneto, instead of being of horseshoe form, are bell-shaped, as shown in Fig. 308. The entire magnet is carried in a trunnion mounting so that the field magnets may be turned to the same extent that the contact breaker is turned to give the necessary advance or retard of the spark, thus insuring that the circuit will be broken with the armature in the same relative position with respect to the field poles.

The method whereby this is accomplished is shown in Fig. 309. The relative positions of the armature and field magnets are shown for both the full retarded and advanced positions of the spark. The movement of the magnets is against the direction of rotation of the armature when advancing the spark and in the direction of rotation of the armature when retarding the spark. The complete magneto is shown in Fig. 308.

Motors in the Italian Offensive

With an Ambulance Driver in Italy During the Attacking and Capture of Gorizia

THE assistants kept away during the passage, only one man walking in front as a guide and the driver having received instructions to jump if he felt that his car was going to take the final plunge.

After 4 hr. labor under the light of a friendly moon, the four cars had crossed and formed up on the Austrian side of the river. Keeping in close formation, the city of Gorizia was entered and a search made for the cavalry dressing stations which had requested our aid. In the main street, with electric trolley car lines laid down it, progress was slow, owing to such obstacles as overturned carts, dead horses and mules, shell holes and fallen buildings. Except for squadrons of cavalry the city was deserted.

No cavalry dressing stations could be found, but the various regimental stretcher bearers busy in different parts of the town frequently hailed us, took our supply of bandages and drugs and filled our ambulances with wounded. When it was decided to recross to the Italian side, the moon had sunk and it was found that the gaps in the bridge had opened more and more. All traffic was from the Italian to the Austrian side and consisted of infantry, munition and general supply columns, with mules or horses. From time to time a wheel dropped through one of the many holes and arrested all traffic, or a cart slipped over to such a degree that to attempt to save it was impossible, or a restive mule paid the penalty of its restiveness by making a 20-ft. drop to the blue Isonzo.

Heavy Cars Not Risked

After an hour's wait the first Ford was got across; an hour later an attempt was made to get the second Ford over, but this was accomplished only after one wheel had dropped through a hole and all hands had lifted the car up while planks were placed across the gap. As a heavier car would certainly have gone right through, it was not attempted to cross with the heavier Buicks and their loads of wounded but to leave them on the Austrian side and after unloading the Fords at hospital return and carry the stretcher cases across by hand. All spare rugs were turned over to the wounded men and the drivers who had to stay with the cars, for August night was cold.

After traveling 100 yd. on the Italian side amidst a dense struggling mass of trucks, mule ammunition and supply columns, infantry and cavalry, extending from the river bank to the remnants of Lucinico, a mile to the rear, it became evident that we should not be able to reach our base. Two roads were available, but they were packed equally and had suffered equally from the effect of the terrible

(Concluded from page 9)

bombardment of the previous days, which had made them unsafe.

The surrounding country was open, razed of every vestige of a dwelling, lined with pitiful wrecked trenches, strewn with corpses and the refuse of battle. Even the pack mules would not attempt to cross it; only a caterpillar tractor could have negotiated such land. There was no traffic organization; he would have been a brave carabineri who would have attempted to create order out of such a welter.

Some little progress was made by much cursing and physical effort, bodily lifting mule carts to the side when they could not be moved further by the animals. But when, in attempting to get through a narrow passage between a gun limber and a shell hole, one of the Fords toppled right over into this latter and the other car was so tightly wedged in the traffic block that it would have been impossible to lift it out with a crane, it was decided to leave them and make our way to the dressing station at Valisella afoot. On the way up two more ambulance cars were encountered. They had received instructions to take medical supplies to the regimental dressing stations established in Gorizia, but for 2 hr. had been as securely locked in the traffic as any vessel in Arctic ice. One of the cars had carbureter trouble, and the mechanic had taken this organ off and was repairing it inside the car with the aid of an electric inspection lamp. He had been working on it for an hour, but during that time the pack had not moved an inch.

After filling rugsacks with food and drink at Valisella, each member of the party set out to return to the Isonzo afoot. In the dim light we had more the appearance of looters than soldiers of the Italian army, and on more than one occasion we were held up by the Carabineri and questioned as to our bundles, our destination and our military mission. On reaching the bridge, day was beginning to break. With it came the realization to every man in that struggling, impotent mass that with daylight the Austrians would open fire on the bridge and approaching roads, all of which were under direct observation. A superhuman effort was made to break clear of the jam. Whip, spur and voice were used; motors roared as they attempted, with the use of low gear, to pull trucks out of shell holes; men swarmed round the motors unable to move under their own power and bodily lifted them out of difficult places. When a horse wagon or motor could not be got under way, the 8-ft. crowbars carried by every Italian army truck were brought into use and levered the vehicle right off the road into the ditch. The mass which had remained solid all night struggled, shook itself, broke and raced for the shelter of the railroad tunnel or the village of Lucinico.

Crawling on bottom gear through the narrow passages with the yawning holes on each side through which men, mules and wagons had dropped during the night; twisting so as to avoid the holes big enough to receive a wheel and which would hold the car prisoner; rushing the safer portions with a rolling and bucking which caused the driver to leave his seat and extracted cries of pain and fear from the men inside, both ambulances crossed the Isonzo and found a comparatively clear road to the hospital. Four minutes after the second car had crossed the Austrians opened fire on the bridge from their hill positions.

From Gorizia, smoking on the eastern bank of the river, the call was being sent out for more ambulances to evacuate their wounded, and the hospital staff established in the shelter of the tunnel gave orders that we should return and do our best, despite the condition of the bridge and the fact that it was under fire. But the traffic police and the engineers interfered by closing the bridge to all vehicles and sending out a gang of men to repair the damage as far as possible.

A Dangerous Passage

By noon the bridge was repaired and open to traffic under the control of an efficient traffic squadron. It was a rough, dangerous passage, with shells which sometimes hit and always threatened. But from the shelter of their dug-outs, which did not always give complete security, the carabineri sent motors and wagons over singly or in small groups and stopped the flow as soon as the enemy caused an obstruction.

Meanwhile, a few hundred yards farther up, the engineers were building pontoon bridges for foot, mule and motor traffic. When one bridge fell under the continuous firing, traffic was diverted to the others while the engineers carried out repairs. For several months the Austrians bombarded and the Italians repaired the main iron bridge without traffic being suspended on any occasion for more than a few hours. Finally, a well-directed shell carried away one of the central pillars of the bridge, causing the surface to sag in a huge V, with the point only 6 ft. from the water in dry times and just awash in the floods. Although useless to all vehicular traffic, even then the bridge was not lost, for the engineers planked the V, put transverse battens on it so as to give a foothold for the infantry and left a narrow strip quite free. Cyclist dispatch riders made use of this strip, rushing down the steep slope, and with their impetus and hard pedalling just managing to climb the opposite side. The bridge was lost, but Gorizia was safe in the hands of the Italians, thanks to the big series of pontoon bridges which assured a steady flow of motors no matter how often or how fiercely the enemy bombarded.

From the Woman's Viewpoint

Official photograph from western front—A British woman driver and an American Buick

U. S. Women

THE registration of women now either in progress or completed in many states is another step toward the registration of all motor car owners. Many of these women have their own cars, which they can put at the call of the local committees and they are expressing their preference for service as motor service in many cases. The women who are directing the registration of the country's women take particular pains, too, to list all women with motor cars, recording information as to experience, willingness to serve, locality of service, whether in the home town, country or abroad, and even going so far as to provide a place for expression of each woman's desire to learn to serve in driving motors.

The rush of women to learn the mechanics of motor cars has been ably met by dealers in various parts of the country. Classes are being conducted weekly with experts who give both theoretical and practical instruction in the operation and care of the car. Women who are studying in these local garages in many cases are members of the Navy League, the Red Cross or other organization doing active war work. They learn to serve, and they do serve.

Active Early

Take Chicago's case. Since America declared war there have been two large bodies of women, and many minor ones, that have gone in for intensive study of the motor car. Many of the women who belonged to one of these organizations belonged to the other also. Dealers on motor row planned with the women the best methods by which they could attain the end desired, and everyday acquaintance with the motor cars. Some of the women never had ridden on the front seat of their cars even. Others had no cars. There were the few who were practical motorists, ready for the ordinary fortunes of motoring. A grammar school principal belonged. Elderly woman and girl joined. This one agreed only to serve in the city. That one would go anywhere.

The Red Cross activities of Chicago have had the benefit of these women's efforts toward making themselves fit in every sense of the word for motor duty. Supplies and transportation from depot to depot have been greatly simplified since women learned to motor. A woman even drives the motor truck that takes hospital supplies to the training stations in the north of the city. The gardening brought on by patriotic efforts to increase the food supply this summer was aided by these women who had learned to motor for Uncle Sam and Uncle Sam's people.

What is true of Chicago is true of the rest of the country to that extent which the size of the locality warrants.

The women of the country have not waited to be ambulance drivers before doing motor duty. Even ambulance service is urged, however. Dr. Edmond Gros, the American physician in charge of the American ambulance drivers and American aviators, is reported to have said in a speech before the French officers:

"Since the United States now is allied with France in fighting Germany, I am violently opposed to American youths coming to France to act as ambulance drivers. Their duty is with the American army shouldering a rifle. American women are plenty capable of driving ambulances here, and we can get all we need to replace the young men now driving."

Of several university units recently arrived in France to do ambulance duty, only three men have been assigned to the ambulance service, letters from abroad state. The rest are truck drivers.

Women are driving many of the ambulances of the war. However, the women at home are doing a valuable service with their cars. Their places could not be filled should they suddenly cease to offer aid. The shortage of farm labor this year will make it possible for motorists to give important service in carrying their own farm produce. Already the women of the cities have begun to carry their own groceries, dry goods and so on home from the stores.

Do Food Best

THE business of food administration, which is under the direction of Herbert Hoover, falls into four great branches: first, the control of exports; second, the regulation of trade to exclude both legitimate and illegitimate speculation; third, the mobilization of the women and men of the country engaged in personal distribution as actual members of the food administration to carry out, so far as their circumstances permit, the advice and directions which they are given toward national conservation; fourth, the erection in every state in the Union of some form of food administration which performs its own functions.

The basic food of the world is wheat, and it seems probable that what the United States has now plus the Canadian crop plus what can be raised this year is only about a billion bushels. Ordinarily the United States and Canada would eat half this. The needs of the allies, however, are more than half. It has been estimated that the immediate duty of the United States is to save and send over seas 450,000,000 bu., and we have only two-thirds that amount to spare. If each person eats three and a half slices of wheat bread instead of five, starvation will be warded off from tens of thousands in Europe. Are you doing your food best to save the wheat?

Whole Wheat Flour

Whole wheat flour is recommended for war bread, because:

It is economical in that more flour is made from a given amount of wheat. In modern milling only 72 per cent of wheat grain is used for white patent flour; the 28 per cent is sold as bran or shorts for stock food. Whole wheat flour contains 85 per cent of the wheat grain.

Whole wheat bread is a better food than white bread. It contains more mineral matter and vitamines, both of which are found principally in the outer wrappings of the wheat grain. Both whole wheat and graham flour have the added advantage of containing a large proportion of the coarser fiber of the wheat. Bran bread is recommended highly, but as an article of steady diet either whole wheat or graham bread is to be preferred, as they are less irritating.

If You Must Eat Wheat Bread, Eat Whole Wheat Bread.

The Readers' Clearing House

DUPLEX CARBURETER EXPLAINED

Used on Engines With Eight or Twelve Cylinders

GRAND RAPIDS, Mich.—Editor MOTOR AGE—Why does the double carbureter, as on the Jackson, give more economical and efficient service than one of the single type?—Irving Monroe.

The carbureter you speak of is used with the eight-cylinder engine of the Jackson. With the advent of the double engine having eight or twelve cylinders arranged in two V blocks, the question of good carburetion has been a problem requiring much experiment and study. Due to the strong cross suction in the inlet manifold from one set of cylinders to the other, the single carbureter frequently gives only indifferent results. Then experiments led to the use of two carbureters, one for each set of cylinders. Results from this arrangement are good, provided the two carbureters are working exactly in unison, but it is quite easy to see that this co-operation is hard to accomplish, especially where the adjustable type of carbureters is employed.

The next step in the development of a suitable carbureter for the multi-cylindered engine led to the double or duplex carbureter, such as the Zenith Duplex, for example, as used on the Jackson car. This consists of two separate and distinct carbureters joined so that a common gasoline float chamber and air inlet are used by both. It is claimed that such a construction does away with cross suction in the manifold because each set of cylinders has a separate intake of its own. Also a carbureter of this type is synchronized because it has no variables, that is no valves or springs to adjust.

Operation of Elmore Two-Cycle

Cairo, Ill.—Editor MOTOR AGE—Could MOTOR AGE give me the intake and exhaust opening dimensions and construction and course of gas in the Elmore two-cycle engine. How is it governed when intake and exhaust work? Also is the crankcase separate on each cylinder in the two-cycle engine such as the Elmore or Chase.—G. R. Heatherington.

We have no record of the size of the port openings in the old Elmore two-cycle engine, but the illustration will give you the general layout of this engine. Referring to Fig. 1, the incoming charge of gas is drawn into the annular chamber D during the down stroke of the piston. The mixture comes from the carbureter to the manifold A and passes to the distributer valve E, thence through the distributer port and inlet valve C. Next it fills the annular chamber D around the piston below the combustion chamber. On the next upstroke of the piston, the gas in the chamber D is compressed and forced throughout the transfer passage into the distributer valve E which has now been rotated partly to admit the new gas. Lastly the gas flows through the transfer port F into the combustion chamber of the adjacent cylinder where it is fired.

Communications Received and Inquiries Answered

Irving Monroe	Grand Rapids, Mich.
G. R. Heatherington	Cairo, Ill.
R. E. Weaver	Lawndale, Ohio
R. N. Shinn	Westhope, N. D.
Oscar Valdsmar	San Francisco, Cal.
Bob Masumoto	Seattle, Wash.
E. M. Baylis	Colorado Springs, Col.
Robert E. Thurmong	Custer, Mont.
J. H. Simmon	Okmulgee, Okla.
E. E. Binkley	Union, Ohio
A. C. Johnson	Kelliher, Minn.
Harold Beeth	Tucumcari, N. M.
Herbert Smeed	Walterville, Ore.
Roy P. McNeal	Graham, Mo.
William R. Rockwood	Cumberland, Md.
George O. Jenkins	Chicago
L. Gottlieb	Indianapolis, Ind.
F. C. H. Newton	Independence, Kan.
John L. Norton	Kansas City, Mo.
Ray Lafever	Oblong, Ill.
Kenneth Olph	Hastings, Iowa
Walter McDonald	Longmont, Col.
H. Clay Latham	Hillsboro, Ill.
F. E. Brooks	Rouleau, Sask.
W. A. McLean	San Francisco, Cal.
C. F. Fulner	Newport, Ky.
James B. Dollin	Richmond, Ind.
Esca Forgy	Shamrock, Tex.
W. W. Bissell	Zearing, Iowa
W. G. Pride	Osseo, Wis.
G. G. McLaurin	Dillon, S. C.
B. H. Owen	Indianapolis, Ind.

Bore and Stroke of Steam Engine

Lawndale, Ohio—Editor MOTOR AGE—What would be the bore and stroke of a simple steam engine developing 8 hp.?

2—How many pounds steam pressure would be required to develop 8 hp.?

3—What pressure of compressed air would develop the same hp.?—R. E. Weaver.

1—About 6½ by 6½ in.

2—The steam pressure should be about 80 lb. when the engine is turning, say, 250 r.p.m.

3—This is hard to say exactly, but we think it would be in the neighborhood of 65 lb.

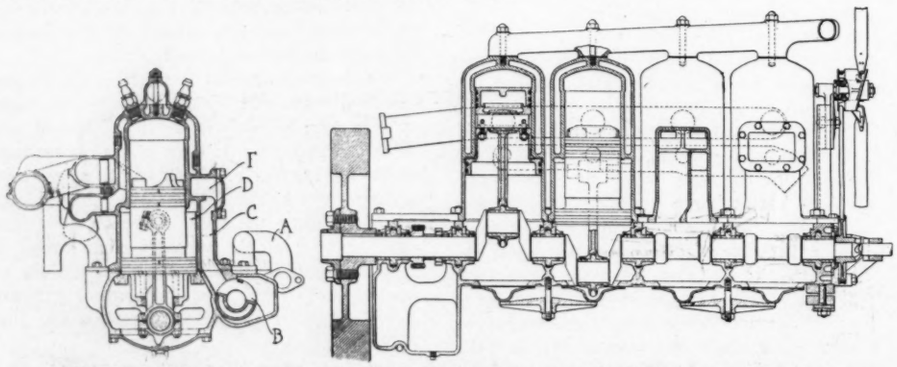


Fig. 1—Sectional view of the Elmore two-cycle engine, showing the disposition of the gas distributer valve and other working parts

DETERMINING BALANCE OF CAR

No Set Rule as to Where Engine Should Be Placed

San Francisco, Cal.—Editor MOTOR AGE—I wish to build a racing car but do not know how to balance same. A former job seemed perfect to me, but on dirt tracks at high speed it would creep on the turns and was very hard to hold. Is there any way to determine how far back the engine and transmission should be from the front axle? As I understand the matter, the car when loaded should have about the same weight on both front and rear wheels, but this seems hard to get without much cut and try process, and the latter is very expensive.

2—Illustrate and describe the auxiliary oil system used on the Hudson Super-Six which competed at the Chicago speedway.

3—Where can I obtain oversize tungsten valves for my Hudson Super-six?—Oscar Valdsmar.

1—There is no hard and fast rule to follow in designing a racing car, so far as we are able to find out. It seems that every driver has his own ideas as to how the car should be balanced and otherwise constructed. You are correct in that the front and rear wheels should carry about the same amount of weight. It is hard to advise you in regard to placing the engine and transmission, because we do not know the wheelbase of your car or the weight of the engine, etc. The cut and try method seems to be the only really good solution in your case. You must bear in mind that many of the successful racing cars are the result of much experimental work which has cost thousands of dollars.

2—We have no illustrations of the oiling system as used on the Hudson racing cars, but this is essentially the same as the system used on the stock models, excepting that an auxiliary tank is placed under the engine for oil which is fed to the oil reservoir of the crankcase by a hand pump, worked by the mechanic. The oil leads or pipes, especially the one going from the oil pump on the engine to the reservoir, were increased in size.

3—Try the Rich Tool Co., 80 East Jackson boulevard, Chicago, which concern, we believe, can supply you with these.

Wiring Diagram of Buick 37

Westhope, N. D.—Editor MOTOR AGE—Publish a wiring diagram for a Buick B-37.—R. N. Shinn.

This diagram was shown in the Readers' Clearing House, MOTOR AGE, July 12.

Combustion Space Measurements

Seattle, Wash.—Editor MOTOR AGE—What would be the dimensions between the cylinder head and the top of the piston when the gas is in the act of being compressed in an L-head type engine of 3¾ in. bore and 6¾ in stroke?

2—What would the pressure of the same engine be?

3—How long must the connecting rod be? I notice it is shorter in a stock than a racing engine.—Bob Masumoto.

1—This is hard to say and depends on how the engine is built. For example, in an engine having a more or less spherical combustion chamber, the greatest distance between the cylinder head and piston top would be directly in the middle of the latter. If the recesses cast in the cylinder head are straight across, you can measure the depth of the cut by placing a straight edge across the opening and gaging with a

depth gage. The next thing to do would be to turn the engine over so that one of the pistons is at the uppermost position. If it projects above the cylinder block, measure this distance and subtract it from the depth of the recess in the head. This would give you the distance between the top of the piston and cylinder head when the engine is on the compression stroke.

2—If you mean the compression pressure, this would be about 60 or 65 lbs.

3—No definite dimensions can be given for the length of the connecting rod as there are so many things to be considered in determining this vital part of the engine. A long connecting rod will be subjected to less angularity than a short one and therefore not stressed so much.

Wants High-Speed Camshaft

Colorado Springs, Col.—Editor MOTOR AGE—We would like to know if we could put into a Chevrolet 490 some kind of a camshaft that would give higher motor speed. Could MOTOR AGE suggest the degree of the valve opening and closing that would be advantageous in bringing about this result? I have already tried grinding the bottom of the cam for a higher lift and found it an advantage, but wondered if there might be another scheme that would assist in bringing about greater results.—E. M. Baylis.

Write to the McCadden Machine Works, St. Cloud, Minn., which concern makes special camshafts for various cars to give more speed. This concern can also give you the proper timing of the valves and any other particulars that you might need to make the engine fast.

Magneto on Old Cadillac

Custer, Mont.—Editor MOTOR AGE—Show diagram and instructions of how to attach a high-tension magneto to a 1912 model Cadillac with generator and storage battery.—Robert E. Thurmong.

A diagram showing the installation of a high-tension magneto on a 1912 Cadillac is shown in Fig. 3. If you do not care to use the generator any more, the best plan would be to remove it and use the bracket for it on which to mount the magneto. Each magneto maker furnishes a special instruction book covering his particular type and the installation of the latter. Therefore it would be well for you to obtain this information when you know just what make of instrument you are going to use.

Ammeter on Hudson

Okmulgee, Okla.—Editor MOTOR AGE—What is the address of the distributer or manufacturer of the Weston duplex instrument shown in MOTOR AGE July 5?

2—Show how to connect on a Hudson 54.—J. H. Simmon.

1—The manufacturer's address is Weston Electrical Instrument Co., Newark, N. J., and the Chicago representative is Badt Westburg Electric Co., 832 Monadnock building.

2—You do not state whether your car is one of the newer models or not. If you have one of the late ones, you simply connect the instrument in the same manner as the present ammeter on the car.

If, however, your car is not fitted with an ammeter you must proceed as follows. Remove the three cap screws on top of the cover plate of the cut-out relay which will then expose the latter. This is shown in Fig. 4. Disconnect the black wire at the top right hand terminal of the cut-out relay at the point marked A and connect the wire to the positive terminal of the ammeter. Run a wire from the negative

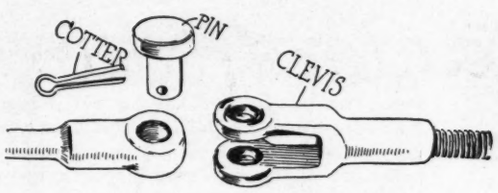


Fig. 2—Usual form of brake rod clevis used to adjust brake rods

terminal of the ammeter to the cut-out relay terminal from which the black wire was disconnected. If the engine is now started up, the ammeter will show the charging rate. Place the ammeter in a position where it can be easily seen when driving the car. Drive the car at different rates of speed and observe the ammeter readings. At speeds of 35 m.p.h. or more there should be little or no increase in the output of the generator.

GAS CONSUMPTION OF FOUR AND SIX
Much Depends on Design and Construction of Car

Union, Ohio—Editor MOTOR AGE—Which will take the more gasoline, a four or a six, each having the same piston displacement?

2—Is the 1914 model W Marathon fitted with a clutch brake? Our clutch drags so badly that the engine must be running very slow or the gears will clash when being engaged. If the brake is worn, how can it be taken up or replaced? The clutch pedal does not strike the floor board before the clutch is fully disengaged.

3—Which consumes the most current from the storage battery on this car, the headlights turned on dim or the side lights? The side light bulbs are 6 volt 4 cp. and the headlights are 9-volt 15 cp.

4—The brakes on this car have a tendency to drag. If they are adjusted as tight as possible, just so they won't drag, and with the aid of a 3-in. extension on the brake pedal, which we have, the rear wheels cannot be locked. The brake lining is fair and no grease or oil works out on the drums. What is the remedy?—E. E. Binkley.

1—Theoretically both engines will use the same amount of fuel, but there are several things to consider which might throw preference to the four-cylinder engine. For one thing, it is perhaps easier to design an efficient manifold for a four than for a six, as the surging of the incoming gas in the latter is important in determining its shape. For example, the first sixes that were brought out showed a difference in the mean effective pressure between the center cylinders and those at the ends. With the four-cylinder engine, this problem becomes less difficult. There is also in the six more friction to be overcome and a greater wall area to the cylinders, which may cause some loss of thermal efficiency through absorption in the water jackets. The fact must also be borne in mind that

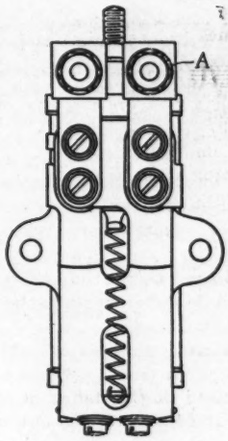


Fig. 4—Cut-out relay of Hudson to which ammeter is connected at A

the present day gasoline economy record is held by a six-cylinder air-cooled engine.

2—This car is not fitted with a clutch brake, inasmuch as it has a multiple-disk clutch, running in oil. It may be that the installation of new plates in the clutch will result in easier gear shifting. Sometimes a good cleaning out of the clutch with kerosene and filling with fresh oil will help matters. You might also try taking off the cover on the clutch housing and giving the three adjustment screws or bolts one or two turns to the right and see if this makes any difference.

3—About the best way to tell this would be to connect a pocket ammeter to the circuit and noting the readings when the lights are connected as you mention.

4—Look for lost motion in the brake actuating mechanism. The average car is fitted with brake rods which are adjusted by a clevis arrangement shown in the illustration. The clevis pin is locked with a cotter pin. This pin should be removed and the clevis taken apart. The clevis may now be turned backward or forward and to make the brakes hold better, the rod is shortened by turning up the clevis a few threads. Remember to take up both rods the same. Cars which employ equalizers are more easily adjusted and usually employ turnbuckles.

Remodelling Ford for Winter

Kelliher, Minn.—Editor MOTOR AGE—How can I remodel a Ford so that it will operate successfully over country roads in the winter time?

2—I have been planning on remodeling a Ford by cutting down the tread to 40 or 42 in., substitute runners in place of the front wheels and place front wheels on a special axle just in front of the rear wheels, then running chains

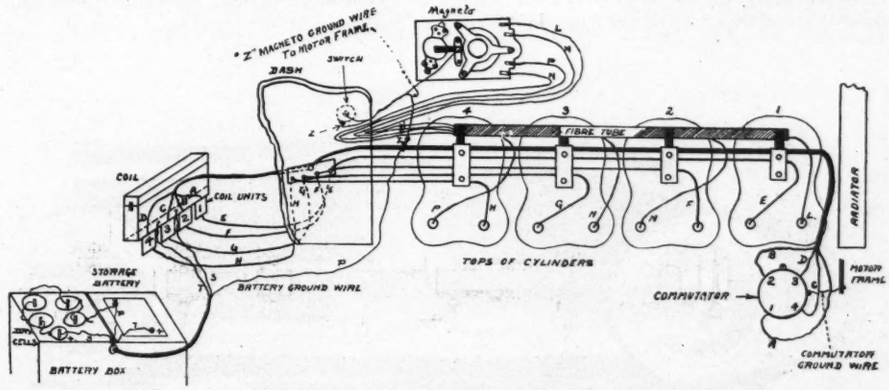


Fig. 3—Wiring layout for ataching a high-tension magneto to the 1912 Cadillac, showing also the manner of connecting battery system

around both sets of wheels, making a caterpillar drive. Which would be the better tread, 40 or 42 in.?

3—What is the cause of the shift gear lever slipping out of high on a 1914 Studebaker four? It does this continuously on the road when the engine is not pulling, as when going down a hill.—A. C. Johnson.

1—The changes you specify in your second question look quite feasible if you want to use the car for winter driving in localities where there is considerable snowfall.

2—We do not think that there would be any noticeable difference whether you used the 40 or 42 in. tread.

3—Worn parts such as the shifter forks and levers or partially broken teeth on the high speed dog clutches in the gearset will cause the lever to slip out of place.

Two Speedster Suggestions

Tucumcari, N. M.—Editor MOTOR AGE—Publish a diagram showing how to convert a 1915 Studebaker Six touring car into a speedster.

2—Publish a diagram for converting a 1911 E.M.F. touring car into a speedster.—Harold Beeth.

1—This is shown in Fig. 5.

2—A suggestion for the conversion of this car into a speedster is shown in Fig. 7.

Trailer Hitch for Car

Walterville, Ore.—Editor MOTOR AGE—Publish a drawing for a trailer hitch to be used on a 1916 Dodge car.—Herbert Smeed.

A suggestion for a trailer hitch for a Dodge Brothers car is shown in Fig. 6. On this particular car the position of the gasoline tank makes it hard to fit a trailer connection without quite a little work. Various forms of trailer hitches have appeared in recent issues of MOTOR AGE and you could probably get some good pointers from these by referring back several issues.

Wants to Lock Electric System

Graham, Mo.—Editor MOTOR AGE—Publish sketch of a lock switch suitable to lock the entire electric system of a 1916 Studebaker car.

2—Does any company make a lock suitable for the above? If so, what is the cost?

3—What will remove lime from the radiator?

4—About what percent of the total power of the engine is taken up by the electric starting and lighting system on a Ford car?—Roy P. McNeal.

1—Three arrangements for installing a hidden or secret switch on a motor car were illustrated in the Reader's Clearing House of MOTOR AGE issue of July 5. One of these could in all probabilities be adapted to the car you mention.

2—Nearly all of the accessory houses carry locks of some sort that can be installed on this car and the prices vary from about $2 to $6.

3—We know of nothing to remove lime from the radiator. It seems that the thing to do is to prevent the deposit of this material by an occasional flushing out of the radiator with a hot concentrated solution of common soda.

4—We do not know whether this has ever been actually tested, but it ought not be so great that the power of the engine is impaired to any extent.

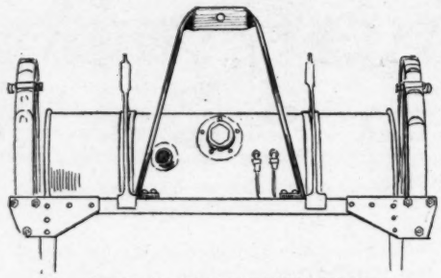


Fig. 6—Trailer hitch attached to rear end of Dodge Brothers car

OVERHAULING ENGINE OF 1913 CAR

Necessary to Remove Lower Half of Crankcase to Adjust Bearings

Cumberland, Md.—Editor MOTOR AGE—Advise method to take engine from frame of a 1913 Buick roadster, model 30; method used in adjusting all main bearings.

2—Does MOTOR AGE think an engine whose bore and stroke are the same is as efficient as an engine whose stroke is larger than the bore? This engine has a dull pound at irregular intervals. It seems to come from near the flywheel. Cylinder blocks were removed, leak proof piston rings installed, connecting rod bearings are in good shape and after being run about 10 miles Nos. 2 and 3 cylinders failed to fire. Spark is all right clear into the spark plug. Each cylinder was tested for compression with a small steam gage braized onto an old spark plug and registered between 45 and 50 lb. When accelerating from 5 to 15 m.p.h. the engine knocks very badly unless spark is fully retarded. When idling engine runs faster with spark fully retarded then it does advanced about one-quarter the way. This engine is a 4 by 4 in. Has this model of a car proved satisfactory? Is there any way I can tell if flywheel is loose without taking engine down? If engine is taken down and main bearing is loose, how can I tell which one it is and proper way to adjust each one. Please tell me how to reline brakes.—William R. Rockwood.

1—The operation of taking out the powerplant of the average car is more or less the same and a few general remarks apply to all. The first thing to do is to disconnect from the engine all such parts as the manifolds and carbureter, hose connections to radiator, electrical equipment, etc. Usually the job is easier to do if the radiator is also removed from the car. After all of the smaller parts are off, the driving yoke is uncoupled and finally the bolts that hold the engine to the frame are taken out. The engine is now loose and can be lifted from the car by means of a small derrick or any other suitable means.

To take up the bearings it is necessary to remove the lower half of the crankcase after having first drained out the oil from it by removing the plug in the bottom. Turn the crankshaft over until the cranks lie in a nearly horizontal position. Now have someone grasp the flywheel and oscillate it back and forth sharply while you hold your hand over first one bearing and then another. The loose one will quickly become apparent. To tighten them remove the cotter pins and nuts from the bolts and drop the cap. This will expose the shims that fit between the two parts of the bearings. From one of the shims remove a single thin leaf of the laminated metal and replace the bearing cap with the shim under it again. Tighten up the bolts as much as possible with an ordinary wrench. If the looseness seems to be gone from the bearing, tightens the nuts as much as possible, and replace the cotter pins. If the bearing is still too loose, remove another shim and in this way proceed with all of the bearings until they are tight. Never take off more than one leaf at a time.

2—The particular engine you mention was considered quite good in its day. The modern tendency is to make the bore smaller than the stroke. The chances are that the engine of your car needs a complete overhauling, inasmuch as it is an old model and has probably considerable piston slap and other worn members.

If the brake lining is worn to a great extent it should be removed by prying it off carefully with a chisel or screw driver far enough so that the rivets can be cut off with a cold chisel. Then punch through the old rivets so that the holes are open. The old lining will do for a pattern and is placed upon the new lining and the holes for the rivets located from it. The holes in the lining should be counter sunk so that the heads of the rivets will come flush with the surface of the lining. All that remains is to rivet the heads of the rivets over and the job is done.

Changing Regal to Speedster

Chicago—Editor MOTOR AGE—I have been quite interested in your designs for converting cars into speedsters. I am the owner of an underslung Regal and would like to have you publish a speedster body with low straight lines. The car is an old model roadster, but continues to give the best of satisfaction and is well worth remodeling.—George O. Jenkins.

A number of suggestions for converting underslung cars into speedsters appeared in the Reader's Clearing House of MOTOR AGE, issue of May 24. If you will refer to these you can, no doubt, get a good idea of what might be done with your car.

Motor Car Engine in Boat

Indianapolis, Ind.—Editor MOTOR AGE—How would a first class Ford powerplant with transmission work in a 20 ft. motor boat and what changes would be necessary?

2—What would be the effect of adding a light fly wheel to the motor at the cranking end?

3—Can I get an oil pump for the motor that will lubricate thoroughly when the motor is tilted as in a boat?—L. Gottlieb.

1—As a general thing it is not a good plan to place a motor car engine in a boat, no more than it would be to place a marine engine in a motor car. Each engine is designed for a certain purpose and must be kept in its respective field. If

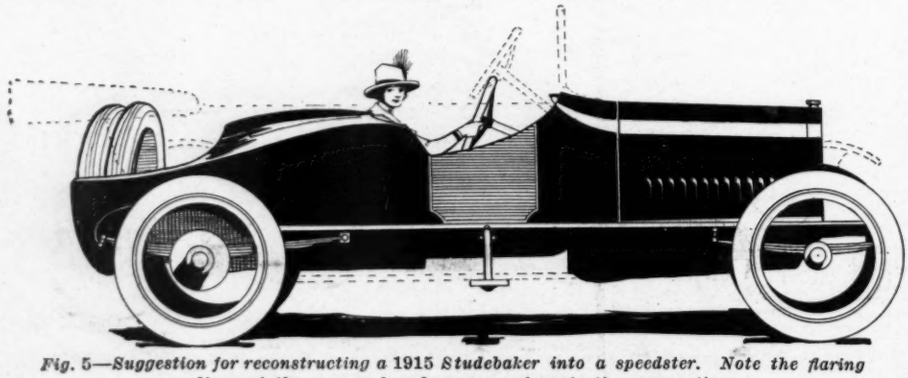


Fig. 5—Suggestion for reconstructing a 1915 Studebaker into a speedster. Note the flaring lines of the rear end and manner of protecting spare tires

you do install the engine in a boat, you must fit a pump circulation of cooling and if possible, a heavier flywheel.

2—It is hard to say. It might be better to counter-balance the crankshaft by the addition of the counter balancing weights for Ford cars recently described in the columns of MOTOR AGE.

3—Write to the Auto Parts Co., Chicago, which concern we believe, sells a pump for Ford engines that is designed to run from one of the push rods.

Welding to Crankshaft

Independence, Kan.—Editor MOTOR AGE—I am planning on building a car of my own design. I have a four-cylinder crankshaft, connecting rod 2¼ in. and the two main bearings 2 in. in diameter. Could the main bearings be built up so they could be turned down to 2¼ in. by welding on, without injuring the shaft?
2—Which is best for differential housing—steel or malleable casting?
3—Would hard babbitt blocks be all right for shims in the main and connecting rod bearings?
4—What type of gear teeth is best for transmission and differential gears, stub tooth or the ordinary type?—F. C. H. Newton.

1—If done by a competent man, yes.

2—Both substances are all right, but in the long run the pressed steel housing might prove the better of the two.

3—Yes.

4—Stub tooth.

Starting a Car on High

Kansas City, Mo.—Editor MOTOR AGE—In a 1916 Dodge car, can you stop and start on high gear?
2—Can you stop and start in low gear going up a hill? If so, how can it be done without the engine going dead?—John L. Norton.

1—We do not quite understand your question. If you mean whether the car can be started by placing the gear lever in the high gear position without going through the different speeds, the answer to your question would be yes. Many cars are capable of doing this, but it is not to be recommended.

2—It is possible to start the car in low gear on a hill, but obviously the clutch pedal must be depressed if it is desired to stop the car and keep the speed lever in the first position.

No Details of Ford Tractor

Oblong, Ill.—Editor MOTOR AGE—Describe Ford farm tractor model B.
2—What is the most successful fuel among owners?
3—What is its hp.?
4—What is its maximum in speed?
5—What is the gear ratio?
6—What is its turning diameter?
7—What make of plow is most convenient with it?
8—Is it possible to use under-mounted plows with it?
9—Have they been demonstrated with it?
10—Has it any governors?
11—Has the Ford a corn plow to go with tractor?
12—If not, what does Ford recommend when tractor is used in corn belt?—Ray Lefever.

Details of the Ford farm tractor have not been made known since last summer when it was described in MOTOR AGE, issue of Aug. 17, 1916. It is understood that several changes have been made.

Engine Misses on Hills

Hastings, Iowa—Editor MOTOR AGE—The engine on my Metz 22 roadster misses at times. When running on level roads it is all right, but when climbing hills and I open the throttle, the engine seems to run on two and three cylinders. The valves have been ground recently, plugs are O. K. Would a new carbureter work better?
2—What size Stromberg should be used on this car?
3—Can anything be used with a Bosch high-tension magneto which will give a hotter and larger spark?
4—Could wire wheels made for the Ford be put on the Metz 22?—Kenneth Dolph.

1—This trouble may be in the secondary circuit, that is, the connections may loose at some points, or the magneto points may need adjustment. It is also probable that a valve may be sticking at times causing the misfiring. Also examine the fuel line and carbureter needle valve, to see if it is partially choked up with dirt. This would show itself on the hills, inasmuch as the engine would be starved of fuel and begin to miss. Better look at the plugs again and see that the points are the right distance apart.

2—About 1½ in. The safest way is to remove the present carbureter and measure the opening of the inlet manifold.

3—There are numerous spark intensifiers on the market designed to do this, and are carried by most accessory houses. They are usually connected between the plug and cable leading to it.

4—Not without a great deal of machine work.

ENGINES OF SAME SIZE COMPARED

Likely That the One Turning Over Faster Will Wear Quicker

Longmont, Col.—Editor MOTOR AGE—What are the advantages and disadvantages of two engine types, both motors having six cylinders, and the same bore and stroke of 3¼ by 4½—the first engine developing 45 hp. at 2100 r.p.m. and its maximum of 56 hp. at 2600 r.p.m., and the second engine having smaller valves and developing its maximum of 45 hp. at 2400 r.p.m.
2—Assuming that the two engines were equally well designed, then, when they were each developing the same amount of horsepower, would not the first require more fuel and accumulate carbon more readily than the second, and would not the second require more lubricating oil and have a tendency to wear out sooner than the first?
3—If the first motor was running at a speed of 2100 r.p.m. and the second at a speed of 2400 r.p.m., which would tend to overheat the sooner, providing the cooling systems were equally efficient?
4—What makes of generators have ways provided that the storage battery cannot be overcharged?
5—Does the Nash Motors Co. still manufacture the four-cylinder Jeffery?—Walter McDonald.

1—It seems as though the preference would be for the first mentioned engine, inasmuch as it developes the maximum horsepower of the second at less revolutions per minute. Thus, the first named engine would be capable of standing some overload which would undoubtedly stall the other. Naturally there would be less wear and tear on an engine that did not turn over as rapidly as another of the same bore and stroke.

2—There is no reason why the first engine should require more fuel than the second, if all adjustments were correct. This is also true of the carbon deposit. It is quite likely that the second engine would require more oil than the first under these conditions.

3—The one that was turning over the fastest would in all probabilities become over-heated first.

4—Nearly all of the generators used for motor car lighting are arranged in such a manner that their output is controlled either by the windings of the machines, or by mechanical governors and clutches. In some generators the electric control is automatic and consists of a reversed series winding which cuts down the current production at the proper time by the simple method of weakening the magnetic power of the field.

5—Yes.

Wants Dual Ignition System

Rouleau, Sask.—Editor MOTOR AGE—I have a new Simms high-tension magneto which I wish to change so I can use batteries for starting. Also a diagram for the wiring and particulars.—F. E. Brooks.

To install a battery system you will have to use a timer of some sort and a coil to step up the voltage of the battery. It may be possible to use the magneto interrupter provided you have the proper type of magneto in which both battery and magneto primaries are controlled by the one set of breaker points. We suggest that you take this matter up with the makers of the magneto and perhaps you can exchange your present magneto for one of the dual type.

Wiring Diagram of Overland

Indianapolis, Ind.—Editor MOTOR AGE—Publish a wiring diagram of the Overland 79.—B. H. Owen.

This is shown in Fig. 9.

Wiring of Saxon Six

Dillon, S. C.—Editor MOTOR AGE—Publish a wiring diagram of a Saxon Six 1917 model?—G. G. McLaurin.

This was published in the Readers' Clearing House of MOTOR AGE issue of March 1.

Preparing the Car for Paint

San Francisco, Cal.—Editor MOTOR AGE—What must I do to prepare the body of my car for a coat of gray paint?—W. A. McLean.

If you expect to paint the car thoroughly later on, the best thing to do is to remove all of the old paint by burning or scraping it off. Then rub the body with sandpaper until the metal has quite a luster to it. Wipe off any dust that might be left on the surface with a rag that has been dipped in gasoline or benzine. You are now ready to put on the primer. This is a special

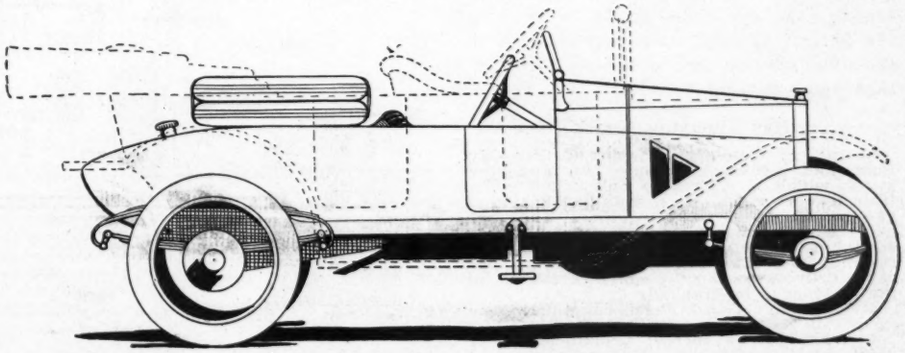


Fig. 7—A 1911 E. M. F. car reconstructed into a snappy roadster. The dotted lines show original body

kind of paint intended to be put on the bare metal before any other paint is put on and can be obtained in a gray color. The primer will dry in 24 hrs., leaving a smooth hard surface, which is then rubbed slightly with steel wool or fine sandpaper.

You can next proceed with the paint you intend to use for the finishing coats. The best way to do this is to obtain what is called a coach color, which when mixed with turpentine will dry flat. That is, there will be no luster to it, the body having a sort of egg-shell finish. The paint must be applied quickly, as it dries very rapidly.

You can leave the body this way until you wish to apply the other coats. Two or more coats are applied, rubbing each coat slightly. After all of the coats are on, the body is given a coat of rubbing varnish and then a coat of finishing varnish.

Grinding Noise in Gearbox

Newport, Ky.—Editor MOTOR AGE—My model 25 Maxwell has had the bevel gear in the differential replaced, and since replacement has developed a constant grind in the gear box and differential when in gear. It is not noticeable when coasting at any speed. The repairmen claim the job all right. Give me your opinion.

2—Publish a diagram of the installation of the switch in starting system, so that when the starter does not work, it can be eliminated and car cranked on dry cells.—C. F. Fulner.

1—If only the ring gear was replaced, it may be that the pinion and ring gear do not mesh just the way they should owing to the new teeth on the latter. Obviously the teeth on the pinion will be worn a little more than those of the new gear and the latter will have to adjust itself to the pinion, which usually takes place after the car has been driven several hundred miles. You will probably find then that the grinding noise will have become noticeably less or disappeared altogether. If you had the job done by a competent man, better abide by his judgment.

2—The diagram is shown in Fig. 8.

Replacing Dry Cells with Battery

Richmond, Ind.—Editor MOTOR AGE—Using a Mea magneto, dual ignition, together with a Mea switch, can MOTOR AGE tell me how to cut out the dry cells and hook onto the storage battery?—James B. Dillon.

This depends upon how large a battery you are using. If the battery is used for starting and lighting, the chances are it would be too strong for the windings of the coil used with the battery system. Otherwise you could simply connect the present wires going to the batteries to the storage battery terminals. Usually in a case of this kind where the maker has intended that dry cells should be used in the battery system, it is best to stick to them and take no chances on the coil windings being injured.

Has Annoying Knock

Shamrock, Tex.—Editor MOTOR AGE—My Ford has recently developed an annoying knock which is noticeable only when going from 5 to 10 m.p.h. It sounds like knocking two flat blocks of wood together. The connecting rod bearings have just been tightened, but without avail. It also knocks when running idle. This isn't a spark knock because it knocks when the spark throttle is in the position to be cranked.

2—Why isn't Dario Resta running in the races this year?

3—What is the correct pronunciation of "Peugeot"?

4—What is the fastest official record ever made by a motor car?

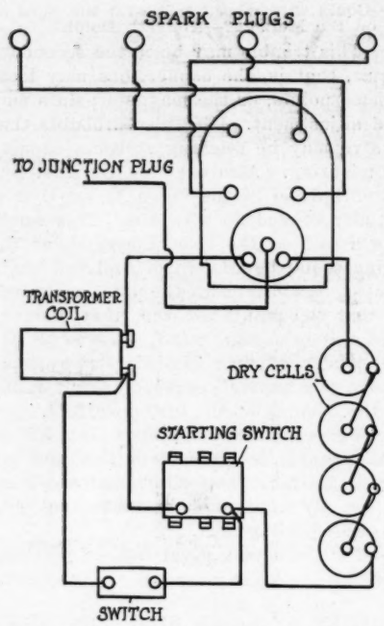


Fig. 8—Manner of connecting switch to replace starting switch on Maxwell

5—Will there be any races at Sheepshead Bay this year?—Esca Forgy.

1—The symptoms seem to indicate that the engine has a worn piston, which causes what is commonly called a piston-slap.

2—He has retired from the racing game.

3—This is pronounced Purrjo in which the j is soft.

4—The fastest official record made by any car was established by Bob Burman in the Blitzen Benz car at Daytona, Fla. He drove this car at the rate of 141.73 m.p.h.

5—Yes. On Sept. 29 and Oct. 27.

HAS TROUBLE IN TRANSMISSION
Reader Overcomes Difficulty on Flanders Rear Axle Set

Zearing, Iowa—Editor MOTOR AGE—Seeing several inquiries in the columns of MOTOR AGE relating to trouble with the rear axle transmission used on the Flanders 20, I thought perhaps my experiences with this trouble might help someone.

The countershaft bearings often work loose owing to the tendency of the hex headed plugs holding the cones on the shaft to back out. These plugs have a hole drilled in the center which is threaded to receive a set screw, which is supposed to be kept tight, thereby locking the plug in the shaft. Due to the large amount of unsprung weight, however, considerable vibration is set up in this transmission, with the result noted above. My method of curing this fault is as follows: Drill out the hole in the plug and thread for a larger bolt, say ½-in. 20 thread. Next screw the plug in the countershaft as far as possible, then cut off flush with the end of shaft. Now thread a cap screw, of the required diameter, for a length of 2 in. and screw this into the plug. Cut off the cap screw so that a little less than ¾-in. of the threaded portion will project from the end of the countershaft. If this is left too long, the shaft cannot be assembled in the case. Next drill a small hole down through the countershaft, plug and stud rivet to keep from unscrewing and dress the ends of the rivet smooth so the cones will slip to place. Drill a hole in the studs for cotter pins; assemble the countershaft and put the cones in place. Next place a large washer on the stud and put a locknut on. A car of this model stripped down has been used here for a couple of years and formerly required an overhauling of the rear end system every month or so. Since making the above changes the car has been driven considerable and an examination of the transmission shows no signs of the old trouble.—W. W. Bissell.

End Play in Crankshaft

Osseo, Wis.—Editor MOTOR AGE—What is the best way to take up the end play in a Ford crankshaft in overhauling? I have sweated brass shims to the rear end of rear main bearings.

2—What flux should be used in soldering a radiator on a Ford? I have trouble running the solder on the upper hose pipe where it is fastened to the brass.—W. G. Pride.

1—The shims you have sweated to the main bearing should prove effective in taking up the lateral play of the crankshaft.

2—Resin, sal-ammoniac or zinc filings dissolved in muriatic acid can be used as a flux for soldering.

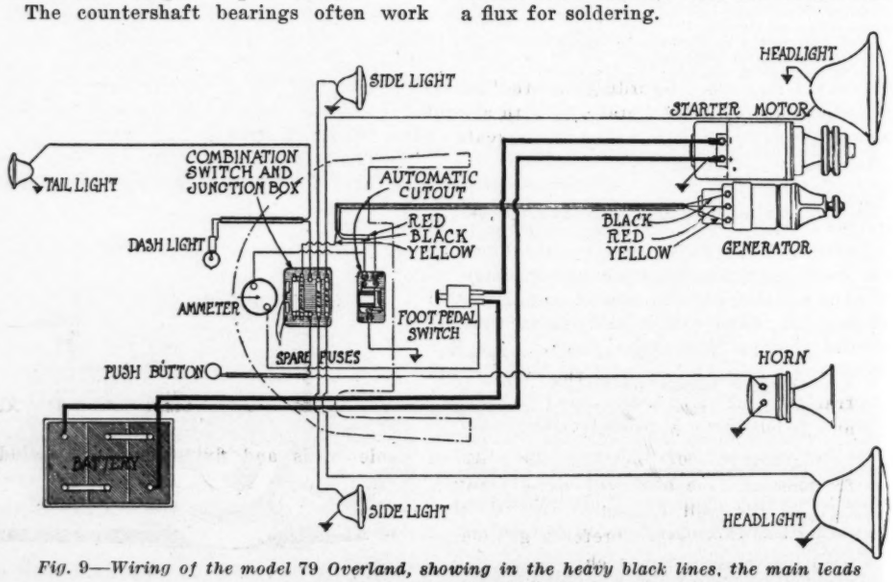
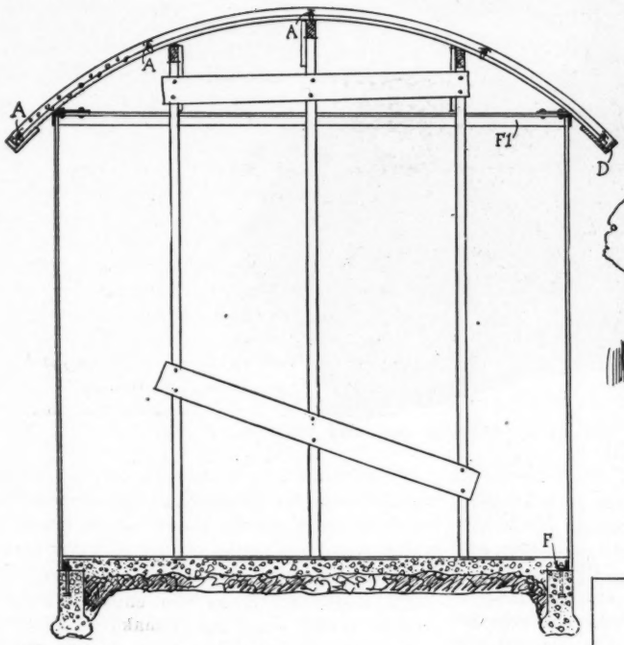
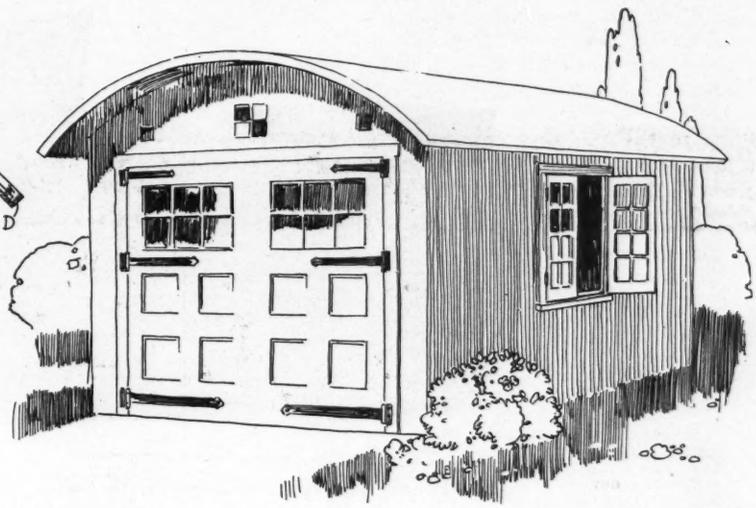
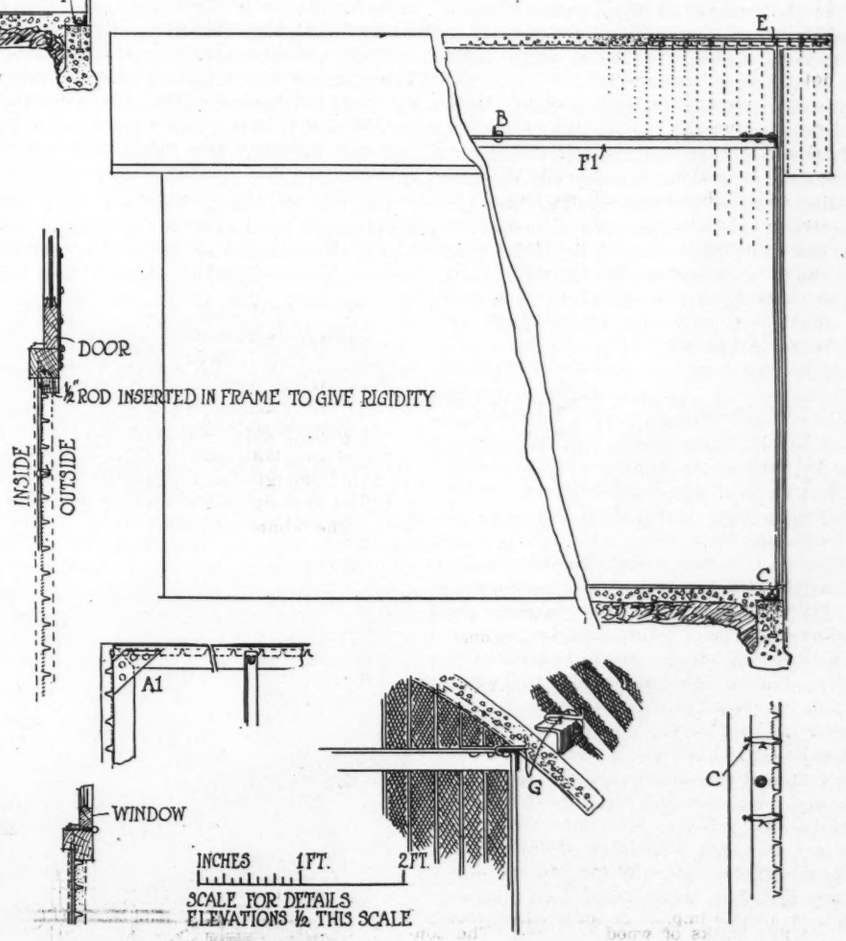


Fig. 9—Wiring of the model 79 Overland, showing in the heavy black lines, the main leads going from generator to battery

The Owner's Garage







HERE is a garage which is absolutely fireproof, and one that would look well on a lot with a stucco house. The type of construction is one that is being used on a large scale for factory buildings where heavy walls are not necessary, but large spaces must be inclosed.

The frame is of two rectangles of 2½-in. angle iron, one, F, of which is anchored to the cement concrete foundation, 1 in. from the outside edge; the top rectangle, F1, is 2 in. wider than the bottom, but the same length. F1 should have its corners tied altogether, A1, and have about two ties, B, of 1½-in. angle iron at equal intervals to support the thrust of the roof.

The material carrying the cement plaster is known variously as "highrib" self-centering, etc., according to the make, and is an expanded metal web with a rigid fold of unexpanded metal at intervals of about 3 in.

The rigid ribs take the place of studding, and the strips are bought cut to the right length to make the height of the building in one piece and are wired in place, using as little wire as possible and bending it so that it will all be covered in the final plastering. C is a suggestion for wiring the base to the angle iron frame by driving nails under the frame and twisting wire around them.

If a curved roof is desired the material for this must be bent to the right curvature at the mill by machinery for that purpose. Some might prefer a gable roof with not too great a pitch.

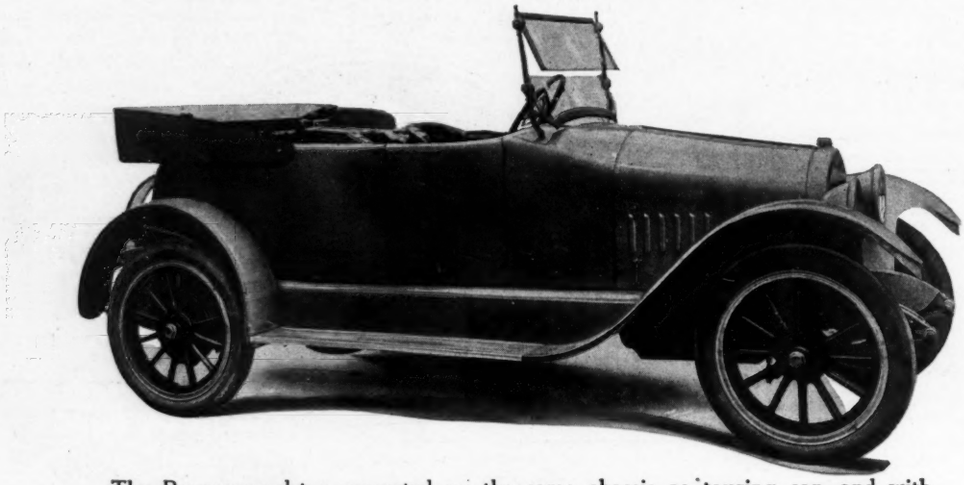
After erecting the framework for the side walls and fixing door and window frames in place, give it one coat of cement plaster on the inside, which is the side that is flat without the ribs. Be sure to insist that the mason uses the minimum of lime putty in this plaster, for if he uses too much you will have an inferior job.

When the inside has set, apply a coat of clear cement and sand mortar to the outside, which will now be easy as the inside mortar will have squeezed through and

(*Concluded on page* 43)

Simplicity Marks Chassis of Pennsy

Roadster or Touring Car, $935



The Pennsy roadster, mounted on the same chassis as touring car, and with touring comforts

A FOUR-CYLINDER five-passenger touring and four-passenger roadster constitute the product of the Pennsy Motors Co., Pittsburgh, according to the concern's recent announcement. The price in each case is the same, namely $935.

Straightline body designing, with a long graceful hood over the engine, together with the fact that the body is suspended rather low, give to the Pennsy car the impression of speed and power. The deep upholstering augments the sense of roominess and comfort, while the straightline roll-edge body adds materially to the looks. Pennsy touring cars are featured by a low tonneau cowl, with an extra touch of smartness in the way of a sloping windshield.

Abundance of leg room for the driver, and with everything on the instrument board within ready reach, renders the car easy to handle. In addition to upholstering the back of the front seat, two large pockets, opening just below the edge of the cowl, are fitted.

Mounted on the same chassis as the touring is the Pennsy roadster, its long, low body giving it a snappy appearance. Interior features of the roadster consist of an aisle of ample width between the front seats, the latter being adjustable forward or backward to suit the driver or passenger. A box having about the capacity of a suitcase is built in at each end of the rear seat and is suitable for thermos bottles, etc. Upholstered tops are fitted to these boxes serving as arm rests when the tops are in place. Another style of the Pennsy roadster has the front seats stationary and does away with the boxes at each end of the rear seat, thus adding to the seating space.

The electrical control which includes the starting and lighting connections, ammeter, oil sight feed and speedometer are conveniently placed on the cowl board and kept lighted at night by a dash lamp. The switch contains, in compact form, the necessary electrical controls and is provided with a locking device, making it, it is said, impossible to start the car or tamper with the lights. Starting, lighting and ignition are operated from a single lever. The starting motor and lighting generator are built in separate units. The generator, in addition to supplying current for starting and lighting, also takes care of the ignition.

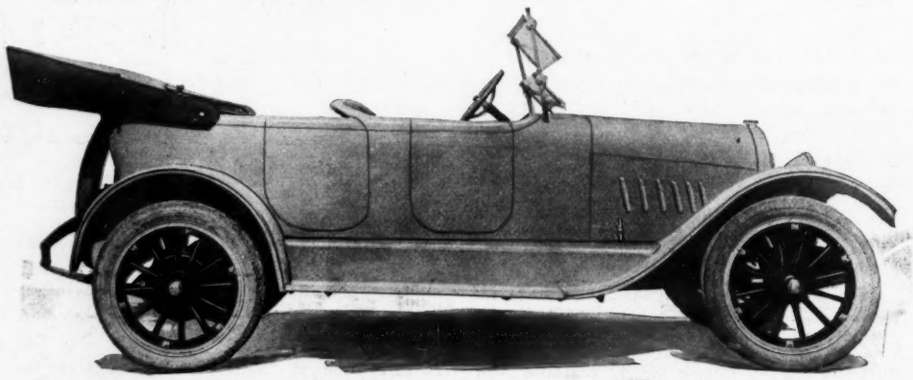
The Pennsy chassis has been kept very simple, such parts as torque and radius rods being eliminated and all of the driving strains being absorbed through the long rear springs. The latter are underslung from the axle and semi-elliptic in design. The gasoline tank, which is of ample capacity, is secured to the chassis at the rear.

All-Year Kissel Cab

APPLICATION of the Kissel all-year car idea has manifested itself in the new cab recently introduced by the Kissel Motor Car Co., Hartford, Wis. The all-year cab in its open form, without the winter inclosures, is standard equipment on all the new Kissel truck models excepting the Flyer light delivery car. The winter inclosure for the all-year cab cost $50 ter inclosure for the all-year cab costs $50 truck driver a closed, warm cab in winter which can be easily changed into the standard open cab in warmer weather.

All sides and doors are covered with treated metal enabling the cab to withstand the twists of the frame when the car is negotiating rough roads. The frame of the cab is made of hard wood securely bolted and locked together. The overall height is a little over 5 ft. from the frame of the car to the roof of the cab. The conventional wooden dash has been replaced by one of heavy plated metal, giving unusual substantiality, it is claimed.

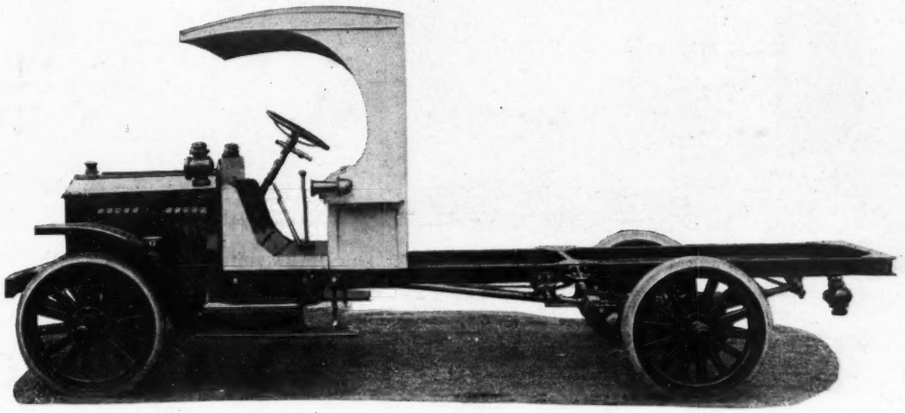
Accommodations are such that three men can be comfortably seated, with plenty of leg room. Doors on each side are 25 in. wide and metal pockets are furnished on each side of the cab for time, tire, gasoline and other record cards and books. The instrument board is placed in a vertical position, with plenty of room for all necessary electrical instruments, speedometer, gages, etc. Pittsburgh glass is used in the door, side and rear windows and the former is protected by a heavy wire screen worked into the glass. A windshield of the rain-vision type is also furnished with the winter equipment.



Straight lines and low suspension of body give the Pennsy car the impression of speed and power

Four Models in Globe Truck Line

Prices Range from $1,375 to $2,085

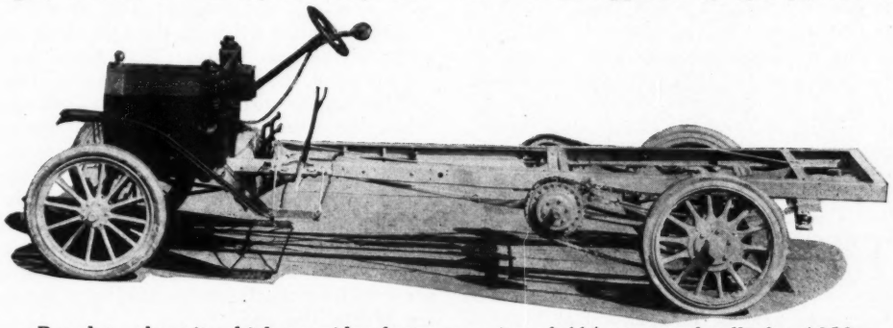


Model A, or the 1-ton Globe truck, which carries the same equipment as the other three models

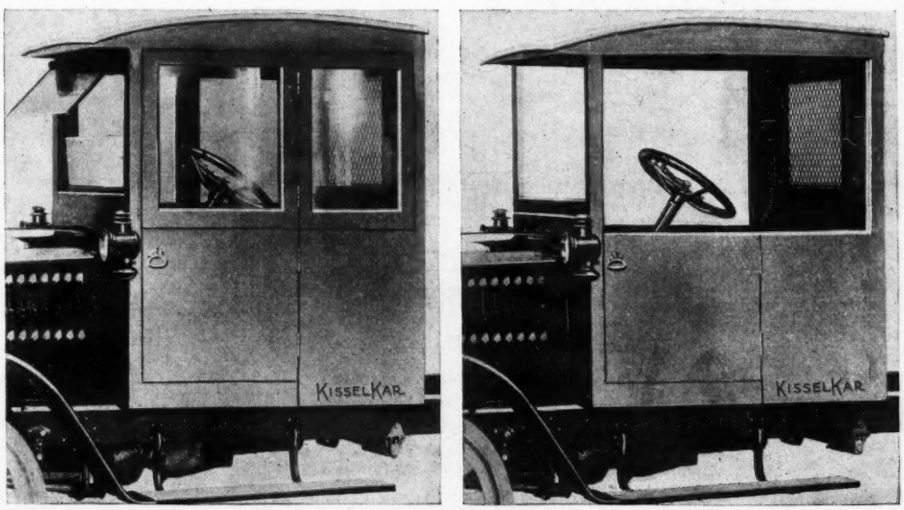
WHAT looks to be a sturdy bidder in the truck line is the Globe motor truck manufactured by the Globe Motor Truck Co., East St. Louis, Ill. This concern is said to be operating a large and well-equipped factory and turning out at the present time four models of standardized motor trucks. Officers of the company are: David A. Marks, president; Walter F. Sheehan, vice-president and general manager; Hanson J. Marks, secretary and treasurer; C. R. Porter, sales manager and C. T. Shafer, engineer.

Model A truck which has a capacity of 1 ton, sells for $1,375; model B, 1½ tons, $1,690; model C, 2 tons, $1,985 and model EC, also of 2 tons capacity, which is listed for $2,085. All four models are equipped with the Continental engine, Raybestos-faced dry-plate clutch, Perfex copper radiator with removable cast tanks mounted on a frame supported by springs, Covert transmission, Celfor internal-gear driven rear axle, Prudden Wheels and Vulcan springs. The trucks are fitted with left hand drive and center control. The steering gear is semi-irreversible and of the split nut and screw type with ball thrust bearings.

Gasoline feed is supplied by a Stewart vacuum system to a Master carbureter. Ignition is taken care of by an Eisemann magneto. Two sets of brakes, one internal and the other external, are conventionally placed on the rear wheels and operate on drums of large diameter. A foot-accelerator is supplied in addition to the hand throttle.



Royal truck unit which provides for a capacity of 1½ tons and sells for $350, without body



Kissel all-year cab, with and without winter inclosures, which accommodates three men with comfort

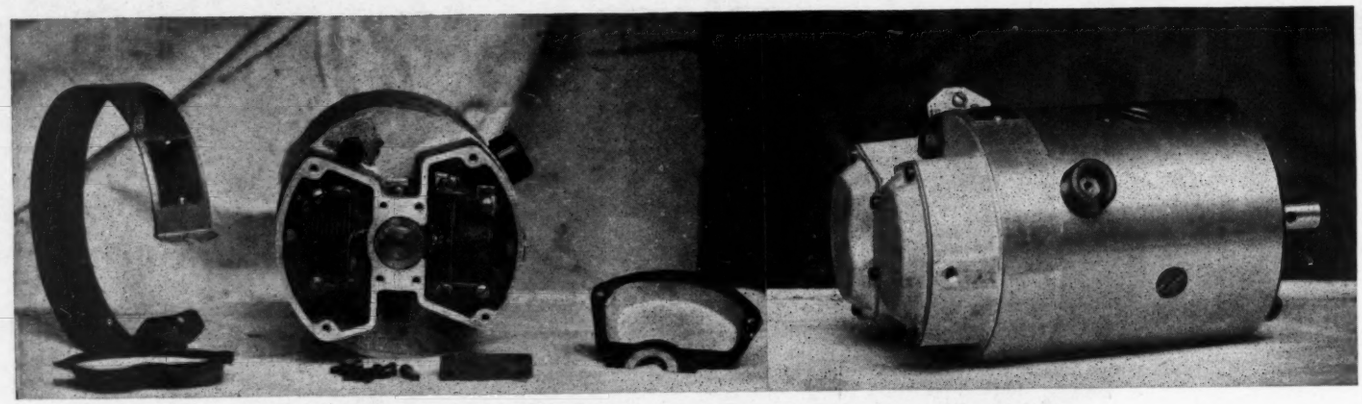
Royal Truck Unit

A TRUCK attachment for Fords, selling for $350, and providing a truck of 1½ tons capacity, is manufactured by the Royal Motors Corp., Detroit.

The frame is pressed steel, and bolted over the Ford frame, which forms a sub-frame for the attachment. The Ford rear axle becomes a jackshaft, and chain drive sprockets are attached in the same manner as the original Ford rear wheels. Platform spring suspension features this attachment. A transverse spring, bolted to the rear crossmember, transfers the load to two semi-elliptic springs resting on the dead axle.

The rear wheels are of truck type, mounted on heavy duty roller bearings, and fitted with 32 by 4 in. solid Firestone tires. The transmission brake is disconnected, and the service brake transferred to the rear axle. The emergency brake is left on the jackshaft. This unit weighs 875 lb., and can be furnished with any desired body. Immediate deliveries can be made to dealers, and preparations are under way for a large production. By use of the attachment the wheelbase of the Ford car is changed to 135 in. The average speed of the truck is 18 m.p.h. and the price of the unit, without body, is $350.

The attachment will be marketed by the Wallace C. Hood Service Bureau.



Two views of Westinghouse lighting generator designed for the army truck and suitable for others, the exposed view, left, showing the accessibility of construction

Army Truck Generator Developed

TO meet all requirements of the government specifications for army equipment as approved by the Quartermaster General last May, the Westinghouse Electric & Mfg. Co. has developed a new lighting generator for army trucks, but which can also be used on other commercial vehicles. It is being manufactured by the company at its Shadyside works at Pittsburgh, Pa.

In appearance the generators are similar to other machines of the Westinghouse line of generators and motors for motor car work. The frame is made from steel pipe whose circular section lends itself to cradle mounting on the engine. The end brackets may be extended to form flanges for end mounting, in which case cradle brackets are not required.

Waterproof Bearings

Large size ball bearings are used for the coupled type. Where generators are mounted on the gear cases by supporting flanges large bronze sleeve bearings are employed, lubricated by a continuous stream of oil. Windings are mechanically and electrically strengthened by a double impregnating treatment which makes them both oil and waterproof. Field coils are securely located on poles and highly insulated from ground. Four brushes are supplied in place of the customary two. But one wire is required to connect the generator to the wiring system of the car. The result is a compact, rugged, accessible simple unit, adapted for hard surface.

The cutout switch and the voltage regulator are mounted within the bracket on the commutator end; removable covers provide access to both. The cutout is adjusted to close the circuit to the battery. When the speed of the generator has reached such a point as to give 6.5 volts at the generator terminals it opens with a reverse current of 1 amp., and at a speed below the cut-in speed to avoid any tendency to chatter when generator is running near the cut-in speed.

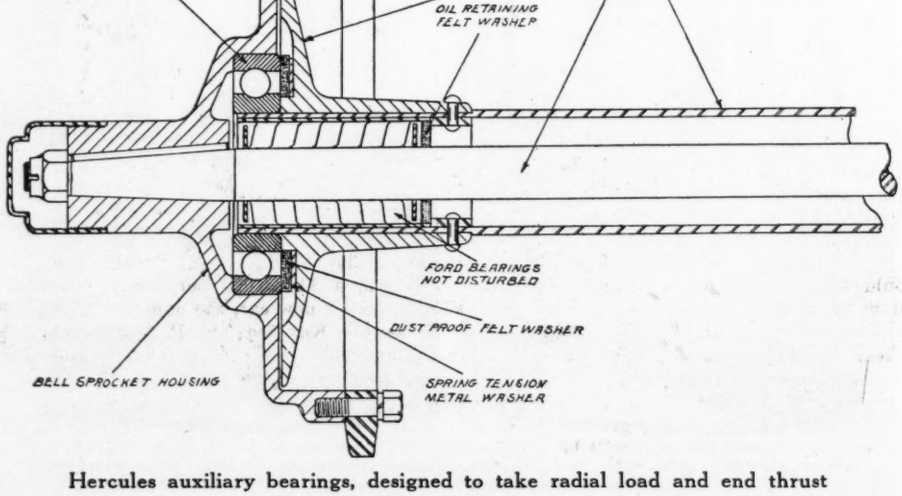
Movement of one of the contacts of the regulator is caused by a cam on the generator shaft so that this operation is positive and contacts are either in intimate contact or entirely open. A slight wiping motion keeps the contact surfaces clean. Regulation is effected by opening and closing of the regulator contacts, thus cutting in and out a resistance connected across these contacts and in series with the field winding of the generator; the time the contacts are closed varies with the speed. The generator will maintain a proper voltage and current output even though the battery becomes disconnected.

The machines are ordinarily adjusted at the factory to give a voltage not greater than 8 volts at 1 amp. output at speeds up to 2000 r.p.m and with a load of 15 amp. to give a voltage not less than 7 volts up to 2000 r.p.m. The generator is capable of giving a continuous output of 12 amp. at 7.5 volts and the range of possible adjustment of the regulator makes it also applicable to some of the higher class passenger or general utility vehicles as well as military trucks.

Hercules Bearings

THE Hercules auxiliary bearings were designed to be used in combination with a bell sprocket housing where the Ford rear axle is used as a jackshaft on Ford chassis converters. It requires no changes or machine work to install a set of these bearings, which fit over the sleeve surrounding the Ford roller bearing which normally takes all of the radial load.

Essentially the Hercules bearing consists of a single-row bearing capable of taking both a radial load and end thrust. It is said that the bearing is capable of carrying safely a load of 3000 lbs. A dustproof metal backed spring-tension washer prevents dirt and water from getting into the bearing. When in position the bearings are on the outer ends of the Ford rear axle housing and engage the sprocket bracket which is fitted on the axle shaft in place of the rear wheel. With this bearing installed, the axle shafts do the driving and the load is carried on the axle housing. When the sprocket brackets are in place on the shafts, they engage the outer race of the Hercules bearing, therefore carrying the driving load on the housing. This, it is said, removes all strains and jars from the axle shafts caused by the slap and drive of the chains. The bearing is manufactured by the Hercules Auxiliary Bearing Works, Chicago.


HERCULES AUXILIARY BEARING THAT CARRIES THE DRIVING LOAD
ALL FORD AXLE PARTS LEFT UNCHANGED
OIL RETAINING FELT WASHER
FORD BEARINGS NOT DISTURBED
DUST PROOF FELT WASHER
BELL SPROCKET HOUSING
SPRING TENSION METAL WASHER

Hercules auxiliary bearings, designed to take radial load and end thrust

The Motor Car Repair Shop

Getting More Service from Your Tires

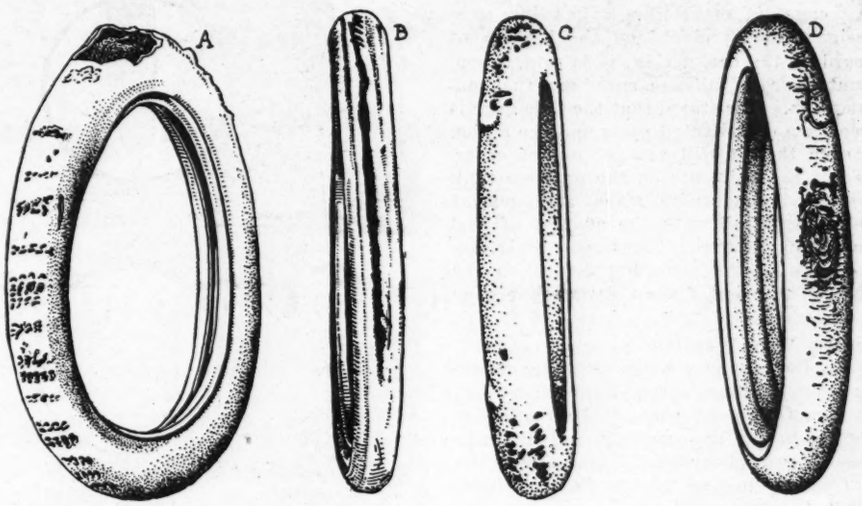
WE Americans have been extravagant. We have literally educated ourselves to be careless with the most expensive things we buy. It is conservatively estimated that the carelessness of American motor car drivers during 1916 cost them in round figures $150,000,000, and this applies only to tires. What has been your share? You have contributed your bit. You must now take this tire problem seriously. Get every mile out of every tire that the manufacturer has built into it. If you don't you are the loser and if everybody is a loser then the tire deficit for 1917 will out-rival last year, for there are thousands more motor car owners to-day than there were a year ago.

You have been brought to realize that a general food conservation is a dire necessity but this isn't going to work any real hardship for you will merely save what you wasted before. Nor will a tire economy reduce the pleasure of driving your car. On the other hand, you will save much expense that you wasted through carelessness or abuse of your tires the past season.

If you follow the advice given in this article you will get more service from your tires, regardless of what make they may be, and at the end of the season your expense will have been so much less than it ever was before that you will no longer neglect your tires.

The illustrations shown here are of the genuine abused tires, hundreds of which are discarded every day throughout the United States before they have given the service for which they were built. It isn't the manufacturers' fault. The mileage was built into each tire but the car driver lost it through carelessness.

Illustration A shows the result of improper application of tire chains. It is rarely that chains are necessary with the modern Black Safety Tread tires of to-day but when chains are used they should not be applied tightly. Leave them just loose enough so that every time the wheel turns the cross chains will not strike the same spot in the tire. If you do not heed this advice you might preserve this illustration as an actual picture of your tire.



Some common abuses of tires. A shows the result of improperly fitted tire chains; B, faulty wheel alignment; C, neglected cuts; and D, results of skidding

A more common tire injury is shown in illustration B. This effect is due to faulty alignment of the front wheels. A bent axle or steering knuckle may be responsible or possibly the demountable rim was not perfectly applied.

Accidents are not always responsible for the front wheels being out of alignment but frequently this is the case. All cars, through no fault in manufacture, are subject to this condition and the first indication will be given when you notice the tread of one or both tires wearing as though a rough file had been used on them. If the tread becomes worn through, and the fabric affected, then the tire is beyond repair. Correct trouble quickly to avoid necessity of this. There is but one remedy and that is care. Test your front wheels frequently and be sure that they are in proper alignment. Illustration C shows a casing with two-thirds of its life wasted, for neglected cuts in the tough rubber tread have caused it to blister. In this instance sand and dirt had been forced into the cuts and worked around under the tread. Note the several large bumps where the sand and dirt have accumulated. If a tire is carefully watched for these cuts, a little plastic will heal them quickly and no damage will result.

The tire shown at D shows the effect of skidding, caused by a sudden application of the brakes. Ever fall and skin your knee? This poor tire has experienced worse than that. Part of its face has been scraped off. Purely carelessness.—B. F. Goodrich Rubber Co.

The Owner's Garage

(*Concluded from page* 39)

filled the hollows between all the ribs.

Now put the roof metal in place and brace it temporarily with two by fours as shown, and tie every third rib at the eaves with hooks G, made of No. 4 wire or ¼-in. iron. Five or six rods, A, should be wired to the metal crosswise of the ribs, and some extra short rods must be used to support the eaves and the two by four braces should also extend through holes in the end walls, which can be filled afterward. Two wooden strips, D, should be attached to keep the edge even and straight.

Cover the roof to a depth of 2½ in. with a mixture of one part cement, two torpedo sand and three roofing gravel. This can be troweled smooth, and will be practically waterproof.

After having another good coat of cement plaster inside and out, and on the under side of roof eaves and all, the job will be finished with the exception of a cement floor. Make this about as shown, pitching slightly toward the center and towards the door so that all accumulated water will flow out.

The final plaster coat can be finished to match the house or in any way desired. A few colored tiles may also be inserted at this time as a touch of decoration.

The materials required for the walls, floor, roof and foundation of this garage as shown, 16 ft. long, are:

Coarse gravel ¾ in. to 1 in. size	5 yds.
Roofing gravel ¼ in. to ½ in.	2 yds.
Torpedo sand	7 yds.
Cement	21 bbls.
Lime (to fatten first plaster coat)	1 bbl.
Cinders (or gravel under floor)	2 yds.

A small amount of lumber will also be needed for foundation forms, braces and scaffolding.

TO MAKE KAY-SEE CAR

Kansas City, Mo., Aug. 4—The Mid-West Motor Co., a $1,000,000 corporation, will manufacture a new car, the name of which is to be the Kay-See. B. P. Bagby, the president of the company, expects to close a deal for the location of the factory as soon as possible. Mr. Bagby designed and built the Ben-Hur car of Cleveland, Ohio, and is one of the directors of that company.

The Accessory Corner

Cole Gasoline Gage

THE Halewick Muehlahausen Co., Chicago, is marketing a gasoline gage designed to be placed on the instrument board of the car, giving, it is said, a constant record of mileage, speed and fuel consumption. It is stated that the Cole gage is free from complicated parts and the action is such that it will not get out of order. One of the units fits on the gasoline tank and this is made with a float arrangement to rise and fall with the amount of fuel carried in the tank. The tank unit is connected with the recording device on the dash. The price of the Cole gasoline gage is $5.

Dayton Wire Wheels

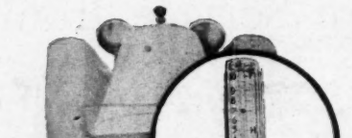
The Dayton wire wheel is being manufactured by the Dayton Wire Wheel Co., Dayton, Ohio. At present the factory is manufacturing and making deliveries on wheels for Ford cars, but is planning in the near future to add wheels for additional makes of cars.

Special tests have been made with Dayton wire wheels that assure, it is stated, at least 25 per cent extra tire mileage when these wheels are used. This is due, it is claimed, to the resiliency and the important feature of heat radiation which is made possible by the construction of the wheel. The triple laced method of securing the spokes is in Dayton wire wheels. Although this organization is less than a year old it has been fortunate to secure materials and thereby make immediate deliveries of the wheels.

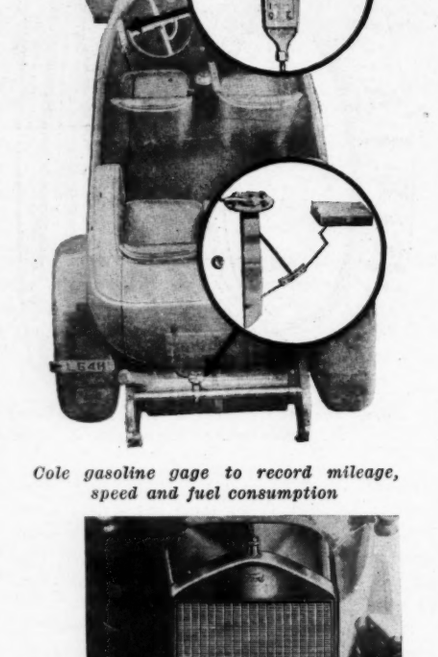
Bear Starter for Ford Cars

This is a starter designed to start the Ford engine from the front seat of the car. Its predominating feature is the three-to-one gear, driven by a tapered drum and the fact that it is placed under the hood independent of all of the working parts of the car. The drum revolves three times with each operation, spinning the motor a complete revolution over two compressions and past two ignition points, giving both leverage and speed. When the handle is pulled from the seat, the pull is transmitted by flexible cable direct to the drum which immediately begins to revolve at great speed and in an instant the second compression point has been reached, the motor has drawn in a full charge of gas and generated a hot spark. There are no corners or pulleys to work around, making the pull easy and wear on the cable negligible. The starter is bolted on to the motor base. No holes need to be drilled and no parts disturbed. The Bear Mfg. Co., Rock Island, Ill.

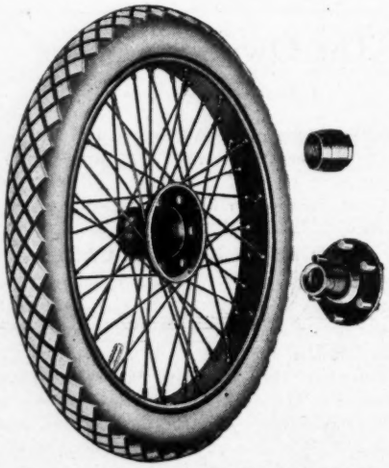
Conover cowl-windshield for Fords of 1912, 1913, 1914 *and early* 1915



Cole gasoline gage to record mileage, speed and fuel consumption



Bear starter, showing manner of installation on Ford



Dayton wire wheel, which uses triple laced method for spokes

Goodyear Tire Booklet

An addition to tire literature which will be welcomed by motorists is the booklet just issued by The Goodyear Tire & Rubber Co., Akron, Ohio, on Maximum Mileage. Many valuable suggestions are advanced which every motorist might capitalize. Among these are the testing of air pressures to insure service, the avoiding of bumps which cause breaks on the inside of the tire where its presence is unknown until the announcement comes in the shape of a blow-out, the proper use of chains, the right way to carry tubes, the proper application of brakes and many other important considerations to which tires are entitled.

Locke Trouble Detector

This consists of a small metal clip to snap on the base of a spark plug and carries a hinged vertical member which can be swung toward or away from the plug terminal for testing and other purposes. With a set of these detectors, one to each plug, it is possible to isolate any cylinder and thus test each one under actual working conditions, or all of the cylinders can be tested together. To test for a spark the arm of the instrument is pushed to within $\frac{1}{16}$ in. of the plug top, thus forming a spark gap. These detectors also offer protection against theft of the car, as they can be put into position so that the arm touches the plug and in this way short circuit the flow of current to the engine. The devices are said not to give a shock to the operator and may be left on the car as permanent equipment. The price is 25 cents each. Locke Mfg. Co., Ravenna, Ohio.

Prest-O-Lite Welding Equipment

The Prest-O-Lite Type H welding equipment provides the necessary apparatus for covering a wide field of oxy-acetylene welding operations. The illustration shows a typical portable welding outfit using the type H equipment, compressed oxygen and Prest-O-Lite dissolved acetylene. The important feature of the outfit, the blow-pipe, is designed to use compressed gas only, and works on the equal pressure system—that is to say, both gases are delivered to the blow-pipe inlets at equal pressures and no injector device is necessary. This insures a steady neutral welding flame and brings the oxygen consumption down to a minimum, it is said. The gases mix near the handle and flow together along the full length of the stem. Both oxygen and acetylene inlets on the blow-pipe are fitted with fine adjustment control valves. The one on the oxygen supply is so placed that the operator while working can make any slight necessary adjustment with the fore-finger of the hand that grips the blow-pipe. The handle of the blow-pipe is fitted

with anti-fireback chambers for both gases, filled with a special material through which it is impossible for a flame to pass, it is stated. The price of the type H equipment, which is $75, does not include the truck or cylinders. The Prest-O-Lite Co., Inc., Indianapolis, Ind.

Banker Windshield

The Banker Windshield Co., Pittsburgh, Pa., has recently placed on the market two new types of windshields designed to be placed on commercial cars. The new models are called Nos. 12 and 14. Model 12 shield is intended to be attached to the dash and roof of the cab, thus eliminating the use of stay rods and cab supports. The other model is meant for use on trucks of light weight, ranging from 1,000 to 1,500 lbs. capacity. These shields are of the rain vision type and constructed, it is said, in a workmanlike manner.

Carborundum Grinding Compound

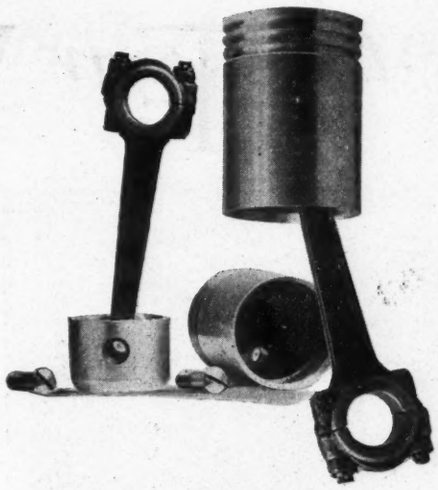
This is a valve grinding compound put up in a handy combination can or in tubes. It is said to cut very fast and clean and is composed of carborundum grains or powder and mixed with grease. The grains are graded or sieved through fine screens and the finest goes into what is called the coarse compound. Then the fine powders, that are really too fine to grade by screening, are graded by being floated on water. These are the ones used in making the fine grade, or the one used last when grinding a valve. The combination can is so arranged that one side of it carries the coarse grade and the other the fine. Each can is said to hold enough compound to last several seasons. The Carborundum Co., Niagara Falls, N. Y.

Independent Detachable Pistons

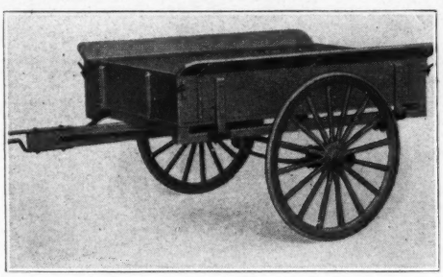
The Independent Quick-Detachable Pistons are designed to eliminate the inconvenience of adjustment and repairs by making the engine more accessible. These pistons can be removed from the engine without disturbing the running parts of the engine. They are furnished with or without rings, in aluminum alloy or fine gray iron or semi-steel. The piston retainer is directly connected to the connecting rod of the engine and does not receive any wear, it is said, its only purpose being to hold the piston in place. The piston and rings, which are subjected to the usual amount of wear, may be replaced at a nominal cost. The makers state that there is an Independent Quick-Detachable piston made to fit retainers of every make of engine, motor car, airplane, marine, or otherwise. Independent Piston Mfg. Co., St. Louis, Mo.

Conover Cowl-Windshield

The Conover combination cowl shield and windshield is intended to be placed on Ford cars of 1912, 1913, 1914 and early 1915 models. The cowl is a single piece steel stamping and enameled black to match the rest of the Ford car. When in position on the car, the cowl shield protects the coil box and other dash fittings. The windshield is of the rain-vision type and the bottom section can be adjusted in such a position that air will be forced into the driving compartment. The edges of the plate glass are ground to an oval shape and the glass channels, nuts and clips are brass with a heavy coat of nickel. The price complete is $15. If desired the windshield alone can be had for installing on the 1915 cowl-dash Ford, in which case the price is $10. No special fitting is required to install the windshield, it being only necessary to remove the bolts which hold the regular Ford windshield in place and use them for this one. Page Woven Wire Fence Co., Adrian, Mich.



Independent Quick-Detachable pistons, furnished with or without rings



One of the three trailer models made by the Nonpareil Mfg. Co.

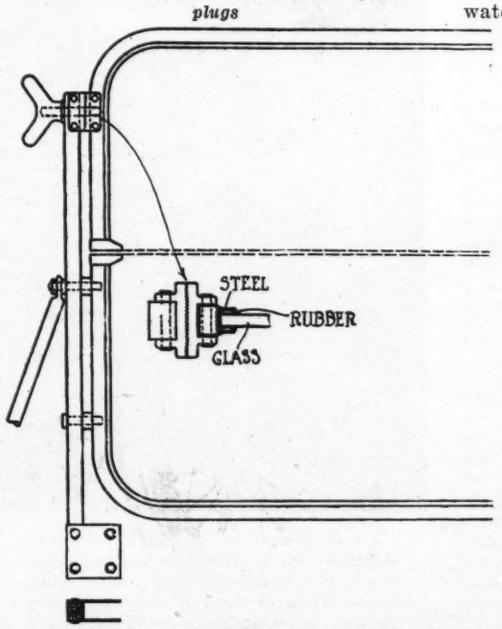
Nonpareil Trailers

The Nonpareil Mfg. Co., Cochranton, Pa., is manufacturing a line of trailers for motor cars, which can be had in three models. They are all two-wheel types and vary in weight from the model A, which weighs 360 lbs. to 465 lbs., the weight of model C. The model A trailer shown in the illustration has a body 6 ft. long and 46 in. wide. It is 10 in. deep and fitted with a flare board 7 in. wide. The capacity is from 1000 to 1200 lbs. The axle is of steel 1¼ in. square. Semi-elliptic springs are fitted. The wheels are 38 in. in diameter and equipped with 1¼ in. solid tires. Timken bearings are used on the axles. The price of the model is $65. The other two trailers are practically the same as the model A with the exception that the dimensions are slightly larger and the bodies are more on the order of the staked type. Model B, which has a capacity of 1500 lbs., sells for $80. The most expensive model is the type C, which is listed at $100 and has a carrying capacity of 2000 lbs.

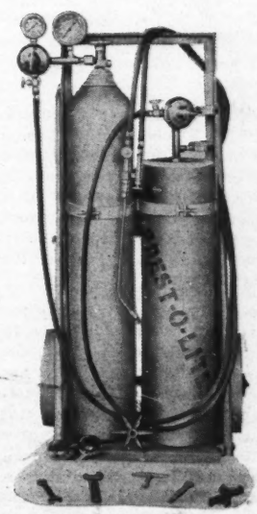
Thermoid Brake Lining

Fifty Million Lives Depend on Good Brakes is the title of a book issued by the Thermoid Rubber Co., Trenton, N. J., on its brake lining products. The book describes manufacturing processes of woven lining as well as the manufacturing processes of Thermoid hydraulic compressed brake lining. It is in reality a comprehensive text book on brake lining. The Grapnalizing process is also explained. Grapnal is the name of the compound with which the asbestos fabric is impregnated. This process is said to make Thermoid brake lining impervious to gasoline, oil, water, dust, etc.

Locke trouble detectors attached to spark plugs

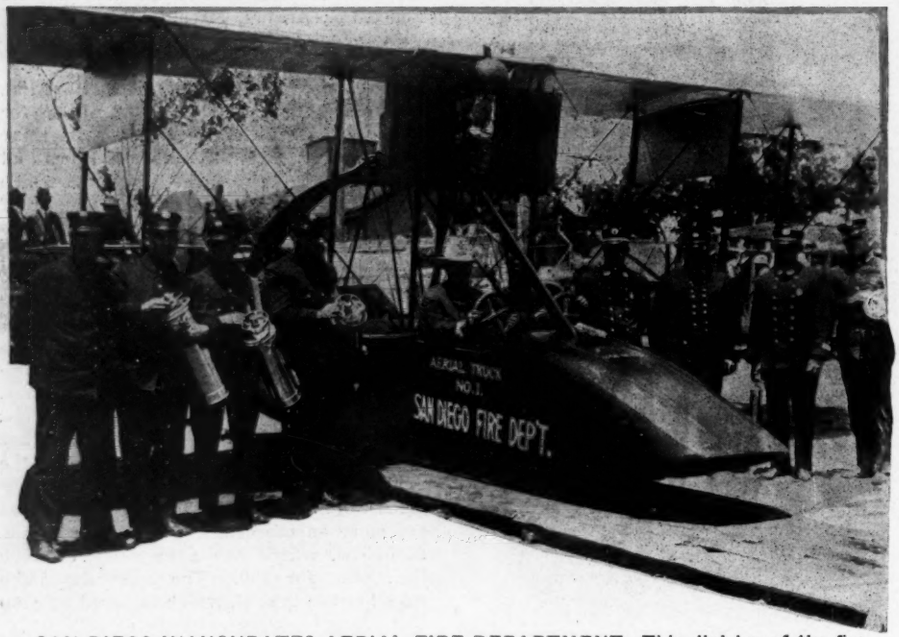


The Banker windshields are of rain-vision type and fit commercial cars



Typical portable Prest-O-Lite outfit for oxy-acetylene welding

From the Four Winds



SAN DIEGO INAUGURATES AERIAL FIRE DEPARTMENT—This division of the fire service is equipped with two 100-hp. flying boats fitted to land on water or land. Each machine carries eight high-powered chemical extinguishers and four men

ADAMS COUNTY, Ill., Organizes—The Adams county motor car owners met at Quincy, Ill., this week and organized a motor club. The officers are: President, Walter Franklin; vice-president, H. L. Beard; secretary, Loren Cox; treasurer, T. M. Beatty.

100 Airplane Plants Busy in England—No fewer than 100 English factories are engaged in some process or other connected with the construction and equipment of airplanes. A growing number of workers is employed in the airplane factories, the increase in the last five months being 25 per cent on the previous total.

Model Roadway to Unite States—The Whitesburg Business Men's Club has been organized at Whitesburg to boost the project of a model roadway from Lexington, Ky., to Norton, Va., a distance of 225 miles. The new thoroughfare is to pass through Beattyville, Irvine, Jackson, Hazard, Whitesburg and Jenkins.

Canadian Club Against Sunday Fee—Abolition of the 50-cent permit fee on Sundays at the border is to be sought by the Automobile Club of Canada, Montreal, which is approaching the collector of customs on the point. It is pointed out that no such regulation is enforced by the American authorities and it is felt that there is no need for it on the Canadian side.

Missouri Commission Ready to Build Roads—Chester D. Mann, formerly in bridge engineering work with the United States department of public roads, and Kirk McFarland, formerly of the construction department of the Illinois state highway department, now are assistant engineers of the Missouri highway commission. The Missouri highway department has in its treasury $700,000, chiefly the result of registration fees, and there is now available from federal funds $510,000. The commission already has worked out plans for a system of highways and is in shape to follow up promptly all local activities. The secretary is A. C. McKibbin, who is responsible for the $3,000,000 bond issue for roads in St. Louis county and for the $500,000 in Jefferson county.

Now Australia Is Doing It—The American practice of attempting exceedingly difficult hill-climbs with gears sealed in high has been adopted in Australia, it seems. The latest is a climb staged from Sydney to the Jenolan Caves 3500 ft. up in the Blue Mountains in a Mitchell car, carrying five passengers.

IN HIS DADDY'S FOOTSTEPS—Billy Adolph, Sr., is foreman in the motor room of the Government motor truck repair shop at Fort Bliss, Tex.; Billy Adolph, Jr., fourteen months old, if you please, may be some day, according to weather signs

Owner Reports on Behavior of Car—Ralph O'Neil, Warren, Pa., says he drove his car, a Moon club roadster, 415 miles in a day and a half, averaging better than 18 m.p.g. of gasoline and 2 qt. oil and making the entire trip on high gear. The car was a new one and had not been driven 50 miles before the trip.

Mortality Among Battle Airplanes—A French aero paper estimates that during 1916 nearly 900 enemy airplanes were brought down altogether. Of this number 700 were brought down on the western front, 450 being accounted for by French aviators and 250 by British airmen. In the 450 are included the machines brought down by Americans engaged in French service.

King Gets Gold Medal in Spain—Cable advice to W. R. Vogeler, manager of the King export department, states that a stock King car has won the gold medal in a touring contest held through the Province of Catalona, Spain. This section, according to the King distributor at Barcelona, who sends the information, is the most mountainous section of Spain. The King, with passengers, in a five-day tour won the award.

Going to Bed With the Studebakers—Now comes the Studebaker factory with a "here's-how" to reduce the problems of slumber while touring. A Studebaker car, you are told, can be made up just like any Pullman. The rear seat is just a little narrower than the regulation double bed. Lift up the removable front seats, turn them around so their backs are to the front, pull the back cushion forward and drop it down in the tonneau. There's your bed. A blanket or two and pillows finish the ensemble.

Out by North and Back by South—Nat Lewis, Jersey City, N. J., has started a circle motor trip, during which he will follow the Northern route across the continent and return by the Southern route, making a complete circuit. He will enter the Rocky Mountains through the Bad Lands of Montana and after reaching Seattle will go south 1800 miles to Los Angeles, returning across the deserts of Arizona and New Mexico. Mr. Lewis is driving a Crow-Elkhart cloverleaf roadster.

Wager Leads to Tire-Proof Trip—M. A. Jones of New York has just completed a trip from Pasadena, Cal., to New York as the result of a wager that he could drive his Locomobile across the continent with California air in his tires. He was to entertain with an elaborate dinner on his arrival in New York if any of his tires failed. Mr. Jones won the wager by making the entire distance without one instance of tire trouble. Goodyear All-Weather treads were used.

St. Louis Club to Give Ambulance—The Automobile Club of St. Louis is raising by subscription a fund to purchase an ambulance for the American Hospital Service. In accordance with a request from the War Department for the heavier, more powerful and easier-riding type of ambulance in which the wounded are transported from the field dressing stations to the larger base hospitals behind the lines, the need for these being greater just now, the club has changed its plan of giving a Ford ambulance and will give the heavier kind.

Among the Makers and Dealers

FROST Gear Purchases Factory—The Frost Gear & Forge Co. has purchased for $25,509.57 the factory property of the American Top Co. from L. S. Bisbee, trustee.

Cleveland Plans to Build—Cleveland Motor Plow Co., Cleveland, Ohio, is having plans prepared for a plant in East Cleveland to cost about $300,000.

Scurlock Heads Krom-Nik Gear—L. H. Scurlock, vice-president of the M & S Gear Co., is president of the Krom-Nik Gear Co., recently organized in Chicago. J. W. Fulton is vice-president, and J. S. Houston is secretary-treasurer.

Christman Leaves Burd Ring—P. C. Christman, for the last three years district manager and sales engineer for the Burd Ring Sales Co., Rockford, Ill., has resigned to become vice-president and general manager of the Gill Piston Ring Co., New York.

Maibohm Wagon Reincorporates—The Maibohm Wagon Co., Racine, Wis., which has been building motor cars for more than a year's time, has reincorporated under the laws of Maine with a capital stock of $500,000. The company is building 10,000 sporting-roadster type cars annually.

Prest-O-Lite Branch Expands—The Prest-O-Lite Co., Indianapolis, Ind., has enlarged its branch. H. L. Ware, formerly in charge of the company's St. Louis branch, is now in charge. R. B. Dickson, of Detroit, has been appointed sales manager of the Indianapolis division.

Higrade Has Truck on Display—The Higrade Motors Co., Grand Rapids, Mich., is displaying the first truck manufactured by the company, in a showroom here. Arrangements are being made for building a modern plant in Grand Rapids, to relieve the temporary plant at Harbor Springs.

O'Donnell and Witt with Olympian—Carl L. O'Donnell has been appointed district manager of the Olympian Motors Co., for the Ohio, Indiana and Michigan territory. Frank A. Witt, formerly southern district sales manager of the Hupp Motor Co., has been appointed southern district manager for the Olympia.

Defiance Extends Field—The Defiance Machine Works, Defiance, Ohio, manufacturer of wood-working machinery, has increased its capitalization from $600,000 to $1,200,000, to expand into the automotive field. Large purchases of real estate have been made, and several new concrete and brick buildings will be erected.

Remy Tractor Buys Plant—The Remy Bros. Tractor Co., Kokomo, Ind., recently incorporated for $500,000, has leased the plant of the Kokomo Foundry & Machine Co. for two years with an option of two additional years. Work has started on remodeling the plant. The company expects to manufacture about thirty tractors this year and will begin operations on a large scale in 1918.

Two Join Walker Staff—C. A. Carey has become director of sales and purchasing of the H. J. Walker Co., Cleveland, maker of engines and parts. Mr. Carey formerly was with the Chandler Motor Car Co. as purchasing agent. C. R. Armbrust, formerly assistant engineer of the Chandler Motor Car Co., has been appointed chief engineer of the H. J. Walker Co. The concern has started operations on the new four-story reinforced concrete building, 200 by 60 ft., as the first unit of a series of buildings to be erected within the coming year, which will increase the capacity of the present plant 200 per cent. The company now has a capacity of 150 complete sets of engines and axles per day.

BREAKING GROUND FOR NEW CAR FACTORY—Scene at the breaking of ground for the Fageol Motors Co. factory at Oakland, Cal. Passenger cars, trucks and tractors will be made in the new plant

Coming Motor Events

CONTESTS

Aug.	17—Flemington, N. J., track race.
Sept.	3—Uniontown, Pa., speedway race.
*Sept.	3—Cincinnati, O., speedway race, championship.
Sept.	6—Red Bank, N. J., track race.
Sept.	8—Hillclimb, Pike's Peak, for stripped stock chassis.
*Sept.	15—Providence, R. I., speedway race, championship.
Sept.	22—Allentown, Pa., track race.
Sept.	28—Trenton, N. J., track race.
*Sept.	29—New York speedway race, championship.
Oct.	6—Danbury, Conn., track race.
Oct.	6—Uniontown, Pa., speedway race.
Oct.	15—Richmond, Va., track race.
*Oct.	13—Chicago speedway race, championship.
Oct.	27—New York speedway race.

*A. A. A. championship award event.

MEETINGS

Sept. 12-14	Atlantic City, N. J., Motor and Accessory Manufacturers, mid-season meeting.
Oct. 9-11	Pittsburgh, Pa., National Association of Purchasing Agents, annual congress.

SHOWS

Aug. 6-10	Fremont, Neb., general tractor demonstration.
Sept. 2-9	Spokane, Wash., Interstate fair.
Sept. 9-15	Milwaukee show, State Park fair, West Allis.
Sept. 22-29	Chicago, Ford accessories.
Oct. 13-28	Dallas, Tex., Dallas Automobile & Accessory Dealers' Assn. State Fair.

Martin to J. C. Wilson Co.—C. G. Martin has been placed in charge of the manufacturing department of the J. C. Wilson Co., motor truck builder. Mr. Martin formerly was with the Federal Motor Truck Co.

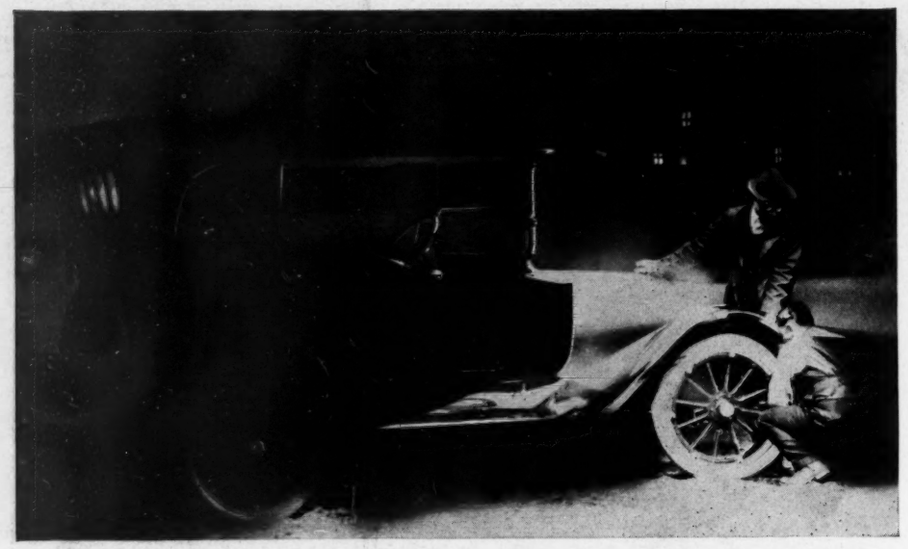
White Co. Adds—The White Co., Cleveland, Ohio, has started excavations for a $300,000 addition to its factory. The building is to be 125 by 500 ft., concrete and steel construction, part one-story and part two-story, with basement.

Wilson Body Company to Add—The C. R. Wilson Body Co. plans an addition to the Detroit plant to increase the facilities of the metal-working department; the addition to cost $175,000.

Coppock to Handle Higrade Sales—L. W. Coppock, vice-president of the Higrade Motors Co., is to handle the commercial end of the business, including sales and advertising, acting as assistant to J. Elmer Pratt, president. He will retain supervision over the engineering department, as formerly.

Triangle Truck Begins Plant—The Triangle Truck Co. has started work on its new plant east of St. Johns, Mich., and expects to be in operation Nov. 1. The building is one-story, brick, fireproof construction, 70 by 236 ft. The company will manufacture 1 and 1½-ton trucks and will have forty men on its initial payroll.

Pennsy Motor to Be Financed—At a meeting of stockholders of the Pennsy Motor Co., Pittsburgh, Pa., it was decided to raise sufficient funds to carry the concern over its present financial embarrassment. W. G. Beckert, president of the board of directors, said that at least $5,000 must be raised at once.



REVERSIBLE HEADLIGHTS FOR NIGHT CARS—Most cars dislike to stay at home nights, and this is how Dodge Brothers solve the problem, put reversible headlights on them so the darkest corner may be light when necessary

A. C. Ellis, secretary of the Pittsburgh Association of Credit Men, agreed to become president of the company if the money is raised. It is said the company has orders for several hundred cars and that it has more than $20.-000 worth of material on hand.

Worcester Maker Changes Name—The firm, W. S. Graffam, Worcester, Mass., manufacturer of Affa specialties, has changed its name to the Affa Specialty Co.

Bates Resigns from King—George J. Bates has resigned his position as commercial manager of the King Motor Car Co. Mr. Bates has not yet announced his plans for the future.

New Trustee for Alter—The Federal court has appointed the Security Trust Co. trustee for the Alter Motor Car Co., Plymouth, Mich. The company has been under receivership of the circuit court since June 26. Negotiations for the sale of the plant are being made.

Gilbert is Carlisle G. S. M.—Charles A. Gilbert, formerly western district manager of the United States Tire Co.'s interests on the Pacific coast and in the Far East, has been appointed general sales manager of the Carlisle Cord Tire Co., New York.

Ellis is Transferred by Goodyear—Arthur W. Ellis, who for the last six years has been manager of the Louisville branch of the Goodyear Tire & Rubber Co., became assistant manager of the New York branch Aug. 1. Mr. Ellis' successor has not yet been named. Before coming to Louisville in 1911 Mr. Ellis was a Goodyear city salesman in Indianapolis.

Williams Now with Picard—Harrie R. Williams, who has been connected with the jobbing trade for some time, has been made general manager of A. J. Picard & Co., which conducts an accessory distributing business in New York. Williams formerly was in charge of the accessory business of the Gibson Co., Indianapolis, and has been active in the affairs of the National Association of Automobile Accessory Jobbers.

Tri-City Dealers Plan Outing—The annual picnic of the motor car dealers of Rock Island and Moline, Ill., and Davenport, Iowa, will be held this year Aug. 8. There will be a series of prizes to the dealers who attend the gathering in the oldest cars. No dealer will be allowed to enter the grounds in a modern car, but each will strive to make the run in the most ancient piece of mechanism obtainable. The various garages of the Tri-Cities will be closed for the outing, and all dealers with their employees and families will put in a day of recreation, with a ball game between two teams, one made up of dealers in Illinois and the other of Iowa dealers.

Ames Has Homecoming for Salesmen—The F. A. Ames Co., maker of Ford passenger bodies and truck and commercial attachments, entertained its salesmen at a homecoming recently in Owensboro, Ky. The week was spent in entertainment and in going over the work of the last year and plans for the coming year.

Wheel Maker Seeks New Location—The Twin Six Corp. of Milwaukee, Wis., manufacturer of wheels for Ford trucks with shock absorbers attached, is negotiating for the location of a factory at Logansport, Ind. The company is capitalized at $1,000,000 and is said to be seeking a location where it can expand production.

Chase Truck Sells Branch—The Chase Motor Truck Co., Syracuse, N. Y., has sold its Philadelphia branch to the Richards-Kelly Co., which will continue the sales and service for the Chase company. E. L. Lindroth, formerly superintendent of service for Chase, remains with the new concern in charge of service. Another Chase change is the appointment of George F. Cox in charge of the New York service department to succeed L. H. Tietge, who resigned.

Pan-American to Build Trucks—Definite plans have been completed by the Pan-American Motor Co., Decatur, Ill., to build commercial trucks. The engineers of the company are working on plans for two trucks of 1- and 2-ton capacity. The company has purchased a large building and will construct another building, 134 by 200. A carload of Timken axles and sixty motors were received this week, making it possible to start the actual assembling of motor cars. Much of the machinery is now in position.

Smith Dealers Organize—The Smith Form-a-Truck Dealers' Association, comprising dealers in Ohio, Illinois, Indiana, West Virginia, Kentucky, Western Pennsylvania and Lower Michigan, was formed at a meeting of approximately 100 representatives in Columbus, Ohio, recently. The officers are: F. Francis Small, Columbus, president; H. W. Pollack, Cincinnati, vice-president; M. H. Cartinhour, Indianapolis, secretary; and A. E. Oatley, Cleveland, treasurer. The next meeting of the organization will be held in Indianapolis in January, 1918. The feature of the banquet was a talk by President E. I. Rosenfeld, who told how he started the Smith corporation twenty-three months ago with $2,000 capital and an idea. At the present time it is a $14,000,000 corporation with raw materials on hand to the value of $2,500,000 and producing 300 trucks daily. The sales force includes about 200 men.

To Rescue Mud-Stalled Cars—The Saginaw Automobile Climb-Out and Shovel Co. has been organized at Saginaw, Mich., with a capital of $25,000. It will manufacture a device to rescue cars stuck in the mud. The officers are: President, S. H. Heginbottom; vice-president, E. W. McFarren; secretary-treasurer, Andrew J. Ritchie; and general manager, C. N. Albee.

Olds Is Building Addition—The Olds Motor Works is erecting a new building, 80 by 400 ft., which will contain 64,000 sq. ft. of floor space. The lower floor will be used for storage of materials, and the upper floor, which will not have a post or pillar in it, will be given to the inspection and care of new cars. A new loading dock of 400 ft. is added as a part of the new building.

Standard Roller Bearing Opens Branch—The Standard Roller Bearing Co., of Philadelphia, has opened a branch of its service sales department in Boston. The branch will be headquarters in the New England territory for all the company's products. Joseph R. MacCollum, for several years purchasing agent for the Packard Motor Car Co., of Boston, will be in charge. This is the first of a series of branch houses of the service sales department which will be opened in about fifteen or twenty of the leading cities.

Westcott Expands Sales Organization—The sales organization of the Westcott Motor Car Co., Springfield, Ohio, has been enlarged with H. G. Root, general manager, directing and assisted by E. H. Gilcrest and P. W. Runyan. Mr. Runyan will be in charge of sales promotion and advertising. The country has been divided into five main districts with a special district sales manager for each, as follows: Eastern, Morrow W. Applegate; Central, E. H. Gilcrest; Middle Western, Harry H. Brehm; Western, J. L. Zismer; and Southern, E. Lee Harrison.

Changes in Republic Rubber Personnel—C. W. Hardin, who has been manager of the mechanical goods department of the New York branch of the Republic Rubber Co., has been recalled to the factory at Youngstown, Ohio, to become sales manager of the mechanical goods division. M. E. Murray, who has been assistant general sales manager, is transferred to Chicago, one of the largest distributing offices, as branch manager. Mark W. Roe has been made consulting engineer. Mr. Roe comes from the McGraw Rubber Co., East Palestine, Ohio, and formerly was with the Diamond company.

New Company at Pittsburgh—The Iron City Products Co. has been formed at Pittsburgh, Pa., and it is said the initial development will have to do largely with the manufacture and marketing of parts for the aircraft, marine and automotive industries. The company now is testing out inventions bearing on the increased efficiency of automotive lines. The president and vice-president are respectively Edward F. McCoy, formerly with the Keystone National Bank of Pittsburgh, and Edwin E. Arnold, formerly of the Westinghouse Machine Co. and more recently chief engineer in charge of design, sales engineering and plant development for the New Departure Mfg. Co.